Print Services Facility for z/OS

Download for z/OS

Version 4, Release 5.0

Contents

Figures

Tables

About this publication

This publication provides information about Download for z/OS®, a licensed feature of IBM® Print Services Facility™ (PSF) Version 4 Release 5.0 for z/OS, hereafter called PSF. This publication was written with the assumption that you are familiar with PSF for z/OS and with Advanced Function Presentation (AFP) concepts.

Who should read this publication

The information in this publication is directed to several audiences:

- The job submitter on a z/OS system who submits a job for processing by Download for z/OS.
- The system programmer responsible for customizing Download for z/OS on the z/OS system.
- The system console operator responsible for starting, stopping, and monitoring Download for z/OS.
- The diagnostician responsible for diagnosing problems.

How this publication is organized

The information in this publication is directed to several audiences:

- The job submitter should read:
  - Chapter 1, "Introducing Download for z/OS"
  - Chapter 4, "Using Download for z/OS for printing or archiving"
- The system programmer should read:
  - Chapter 1, "Introducing Download for z/OS"
  - Chapter 2, "Configuring Download for z/OS"
  - Appendix A, "Checklist of Download for z/OS configuration tasks"
- The system console operator should read:
  - Chapter 1, "Introducing Download for z/OS"
  - Chapter 3, "Operating Download for z/OS"
- The diagnostician should read:
  - Chapter 1, "Introducing Download for z/OS"
  - Chapter 5, "Diagnosing errors in Download for z/OS"

Understanding the syntax notation used in this publication

These rules apply to coding illustrations throughout this publication:

- Uppercase letters are to be coded as shown.
- Variable data is printed in italics. Enter specific data to replace the characters in italics; for example, for PRT(*nnnn*) you can enter PRT(0002).
- Do not enter these symbols as part of a parameter or option:
  Vertical Bar |
  Underscore ___
  Brackets [ ]
- A vertical bar between two values means that you select one of the values.
- An underscored value means that if an option is not specified, the underscored value, called the default, is used.

- Brackets around a value means that you do not have to select the value.

Related information

Publications that are referred to in this document or that contain more information about AFP, InfoPrint Manager, and related products are listed in the "Bibliography" on page 95. For information about all z/OS product publications, see *z/OS Information Roadmap*.

For more information about z/OS, InfoPrint Manager, and PSF for z/OS go to these web pages:
- z/OS website at `http://www.ibm.com/systems/z/os/zos/`
- z/OS output management software at `http://www.ibm.com/systems/z/zos/printsoftware/`
- IBM Print Services Facility (PSF) for z/OS at `http://www.ibm.com/systems/z/zos/printsoftware/psfhome_z_ww.html`
- Ricoh Production Print Software at `http://rpp.ricoh-usa.com/products/software/`

To obtain the latest documentation updates for z/OS base elements and optional features that result from DOC APARs and PTFs, go to the DOC APARs and ++HOLD DOC web page at:

`http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/Shelves/ZDOCAPAR`

To obtain the latest documentation updates for PSF for z/OS, see the appropriate SYS1.SAMPLIB members in Table 1.

Table 1. SYS1.SAMPLIB Members for PSF Documentation Updates

Member	Publication
APSGADP5	*PSF for z/OS: AFP Download Plus*, S550-0433
APSGCUS5	*PSF for z/OS: Customization*, S550-0427
APSGDGN5	*PSF for z/OS: Diagnosis*, G550-0428
APSGDLG5	*PSF for z/OS: Download for z/OS*, S550-0429
APSGMAC5	*PSF for z/OS: Messages and Codes*, G550-0432
APSGSEC5	*PSF for z/OS: Security Guide*, S550-0434
APSGUSR5	*PSF for z/OS: User's Guide*, S550-0435

How to send your comments to IBM

We appreciate comments from you about this publication. Please comment on the clarity, accuracy, and completeness of the information or give us any other feedback that you might have.

Use one of these methods to send us your comments:
- Send an email to: mhvrcfs@us.ibm.com
- Visit the Contact z/OS web page at:
  http://www-03.ibm.com/systems/z/os/zos/webqs.html
- Mail your comments to this address:
  IBM Corporation
  Attention: MHVRCFS Reader Comments
  Department H6MA, Building 707
  2455 South Road
  Poughkeepsie, NY 12601-5400
  U.S.A.
- Fax the comments to us as follows:
  From the United States and Canada: 1+845+432-9405
  From all other countries: Your international access code +1+845+432-9405

Include this information:
- Your name and address
- Your email address
- Your telephone or fax number
- The publication title and order number:
  PSF V4R5 for z/OS: Download for z/OS
  S550-0429-04
- The topic and page number related to your comment
- The text of your comment

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

IBM or any other organizations will only use the personal information that you supply to contact you about the issues that you submit.

If you have a technical problem

Do not use the feedback methods listed above. Instead, do one of these:
- Contact your IBM service representative.
- Call IBM technical support.
- Visit the IBM Support web page at:
  http://www.ibm.com/systems/z/support/

Summary of changes

PSF for z/OS: Download for z/OS, S550-0429-04:

This publication contains additions and changes to information previously presented in *PSF for z/OS: Download for z/OS*, S550-0429-03. The technical additions and changes are marked with a revision bar (|) in the left margin.

General changes:
- References to these products have been removed because the releases are no longer in service:
  - PSF Version 4 Release 2 for z/OS
  - z/OS Version 1 Release 11.0
- References to z/OS Version 2 Release 1.0 (Program Number 5650-ZOS) have been added.
- References to "InfoPrint ProcessDirector" have been changed to the product's new name "Ricoh ProcessDirector".

New information:
- "Highlights" on page 3 has been updated with information about Mixed Object Document Content Architecture (MO:DCA) Interchange System/3 (IS/3) data stream support.
- "Enabling Download for z/OS in the SYS1.PARMLIB member" on page 8 has been added for enabling Download for z/OS.

Changed information:
- Minimum storage requirements for FSSs and FSAs have been updated in Table 4 on page 10.
- Information that Download for z/OS supports IPv4 and IPv6 has been added to "Considerations for configuring TCP/IP" on page 14.
- The CHARS and FCB default values for the JES3 initialization statement parameter "PDEFAULT" on page 21 have been updated to indicate that the PRINTDEV value for CHARS or PAGEDEF is used when WS=U or WS=C is specified on the DEVICE statement. Also, "JES3 WS parameter" on page 22 has been updated.
- A reference has been added to "JCL PARM parameter" on page 24 to refer to *PSF for z/OS: Diagnosis* for more trace options.
- GETHOSTBYNAME has been removed from the list of pending commands in Table 10 on page 43 while FREEADDRINFO, GETADDRINFO, and PTON have been added.
- "Understanding data stream support" on page 47 has been updated with information about MO:DCA IS/3 and descriptions of each data stream.
- COLORMAP and COMSETUP JCL parameters have been added to Table 11 on page 49, Figure 16 on page 55, "COLORMAP" on page 58, and "COMSETUP" on page 58.
- A block size recommendation has been added to "Allocating a PSF trace data set" on page 74 and "Allocating an FSS trace data set" on page 75.

- Appendix A, "Checklist of Download for z/OS configuration tasks," on page 79 has been updated with the task to enable Download for z/OS in the SYS1.PARMLIB member.

Deleted information:
- OnDemand differences have been removed in Table 2 on page 4.
- Statements that Download for z/OS ignores or does not support the COMSETUP parameter have been removed in "Printing parameters not transmitted" on page 51 and "Examples" on page 70.

Chapter 1. Introducing Download for z/OS

Download for z/OS is a separately orderable feature of IBM Print Services Facility (PSF) for z/OS. Download for z/OS automatically transmits system output to other systems in the IBM Internet Protocol network for printing or archiving by these products:

- Content Manager OnDemand (referred to as OnDemand)
- InfoPrint Manager for AIX®
- InfoPrint Manager for Windows
- Ricoh ProcessDirector for AIX
- Ricoh ProcessDirector for Linux
- Ricoh ProcessDirector for Windows
- PSF for z/OS (when PSF acts as a remote server, the AFP Download Plus feature is required)

Notes:

1. "InfoPrint Manager" refers to InfoPrint Manager for AIX and InfoPrint Manager for Windows, unless otherwise specified.
2. "Ricoh ProcessDirector" refers to Infoprint ProcessDirector and Ricoh ProcessDirector for AIX, Linux, and Windows, unless otherwise specified.

Overview

Figure 1 on page 2 shows the steps that occur as Download for z/OS transmits system output from a z/OS operating system to InfoPrint Manager, Ricoh ProcessDirector, PSF, or OnDemand servers on other systems.
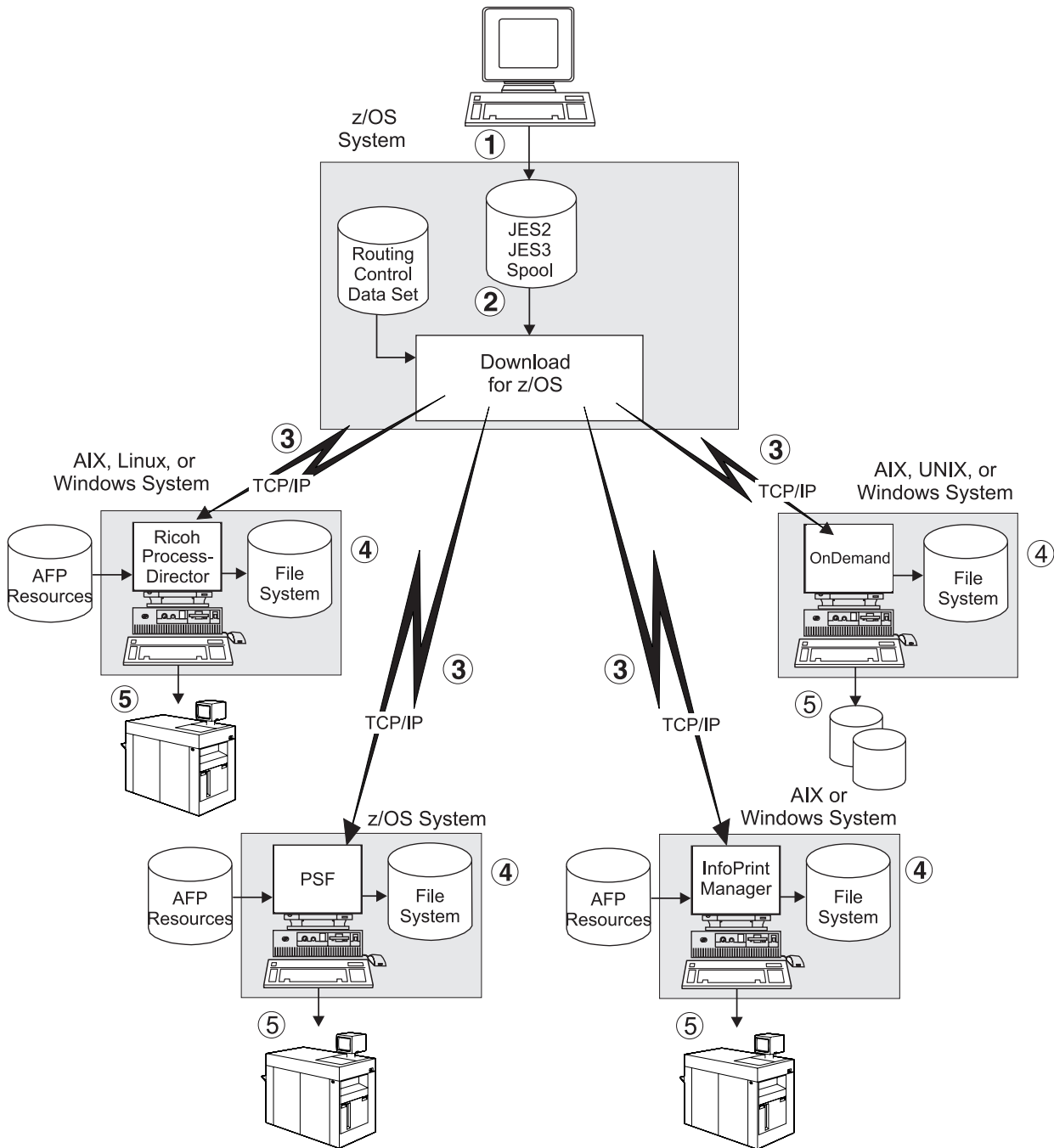
Figure 1. Download for z/OS System Diagram

The following procedure describes the steps that are shown in Figure 1:

1. Users submit jobs on a z/OS system, creating system output on the Job Entry Subsystem (JES) spool in either a JES2 or JES3 environment. The job submitters can specify job control language (JCL) parameters that direct the output data sets to Download for z/OS and also to a remote (receiving) system. The data sets can contain any type of data stream.

2. Download for z/OS, running as a JES2 or JES3 functional subsystem application (FSA), selects output data sets from the JES spool according to installation-defined JES work-selection criteria, such as class, that correspond to

JCL parameters that are specified by the job submitters. Several Download for z/OS FSAs can run at the same time to process a high volume of data.

3. Download for z/OS transmits the output data sets, with print options that include the JCL parameters, to remote systems in the Internet Protocol network. Download for z/OS uses routing information that is specified by the installation in a routing-control data set to determine the remote system that is to receive the data. The routing information associates JCL parameters that are specified by the job submitter (output class, destination, and form name) with the IP addresses or host names of remote systems and receiving servers.

4. Remote servers receive the data sets into file systems. These products provide servers to receive data from Download for z/OS: InfoPrint Manager, Ricoh ProcessDirector, PSF, and OnDemand. The AFP Download Plus feature of PSF is required to enable PSF as a remote server for Download for z/OS. Several servers can run simultaneously on one system to handle large amounts of transmitted data.

5. The remote servers process the received files according to instructions coded by the installation in a shell or Perl script or exit routine.

Highlights

Some highlights of Download for z/OS are described in the following list:

Automatic routing
> The installation controls the routing of data sets by pairing JCL parameter values with the addresses of remote systems and servers in a routing-control data set. Thus, the routing process can be transparent to the job submitter, requiring little or no modification to existing JCL statements.

High-speed data transfer with no DASD requirements
> Download for z/OS sends data to the remote system by using internal buffers and the TCP/IP socket interface, achieving a high transmission rate with no additional DASD requirements. Thus, Download for z/OS is suitable for transmitting large amounts of data.

Automatic error recovery
> When an error occurs during transmission of data from the z/OS system to the remote system, Download for z/OS automatically tries the transmission again according to installation parameters. This error recovery reduces the need for operator intervention because of transmission errors. The installation specifies the number of times to try each failed transmission again, and how long to wait before trying the transmission again.

Guaranteed data integrity
> Download for z/OS verifies that all data has been successfully received by the remote system before deleting a data set from the z/OS system. If transmission is not successful after trying again, JES holds the data set.

Restart from a checkpoint
> When requested, Download for z/OS takes checkpoints of a data set being transmitted from the z/OS system to the remote system. The requester specifies the interval between checkpoints. After a transmission error, Download for z/OS tries again from the last checkpoint, which reduces transmission time for large data sets.

Transmission notification

When requested, Download for z/OS notifies the job submitter when a data set is successfully transmitted, held by the system because of an error, or canceled by the operator.

Seamless system management

The system operator manages Download for z/OS with the same JES or System Display and Search Facility (SDSF) commands that are used to manage PSF for z/OS.

Accounting

Download for z/OS supports System Management Facility (SMF) accounting by recording the number of bytes transmitted and other processing information in a type-6 record extension.

Data stream support

Download for z/OS supports all types of data streams that you can print or archive. These data streams include MO:DCA Presentation Interchange Set (IS) data streams, including the newest interchange set, MO:DCA IS/3. While providing interoperability among AFP products that are IS/3 compliant, MO:DCA IS/3 also provides enhanced functions, including support for color and the latest fonts, images, and graphics. See *Mixed Object Document Content Architecture Reference* for more information.

Download for z/OS and AFP Download Plus

With the AFP Conversion and Indexing Facility (ACIF) feature, Download for z/OS performs similar functions to another PSF feature, AFP Download Plus, with the differences in Table 2:

Table 2. Download for z/OS compared to AFP Download Plus

Download for z/OS with ACIF	AFP Download Plus
Processes any data stream that you can print or archive. Optionally, you can use ACIF to transform line data and XML data to MO:DCA-P format before transmission.	Processes only MO:DCA-P data, line data, and XML data. Line data and XML data are automatically transformed to MO:DCA-P format before transmission.
Data transformation and transmission are separate steps.	Data transformation and transmission are a single step.
Optionally includes inline resources with MO:DCA-P data. If the resources are duplicated on the remote system, you can omit them for a smaller file and more efficient download.	Includes all required resources for printing in the downloaded print file, including PSF and JES default resources.
Does not encode the downloaded print file.	Uses an internal algorithm to encode the downloaded print file, including the resources.
Supports PSF Exit 15 (Print Parameters).	Supports multiple PSF exits.
When running in multiple data set mode with Exit 15, only one FSA can send jobs to a remote system server at any time. Each FSA needs its own unique remote system.	When running in multiple data set mode, one or more FSAs can send jobs to the same remote system server at the same time.
Produces SMF type 6 records in a variant of the PSF format.	Produces SMF type 6 records in the same format as for PSF.
Does not perform RACF® checking.	Performs RACF checking for user resource libraries.

Chapter 2. Configuring Download for z/OS

This chapter provides a technical overview of Download for z/OS and describes the tasks the system programmer must perform to configure Download for z/OS on a z/OS operating system.

A system administrator must also configure the remote system for Download for z/OS, as described here or in one of these publications:
- *IBM DB2 Content Manager OnDemand for Multiplatforms: Installation and Configuration Guide*
- *InfoPrint Manager for AIX: Procedures*
- *InfoPrint Manager for Windows: Procedures*
- *Ricoh ProcessDirector for AIX: Planning and Installing*
- *Ricoh ProcessDirector for Linux: Planning and Installing*
- *Ricoh ProcessDirector for Windows: Planning and Installing*

Overview

Download for z/OS consists of a program that is running on a z/OS operating system and one or more servers on remote systems, such as AIX, Linux, or Windows operating systems. Figure 2 shows how Download for z/OS distributes a data set from the z/OS JES spool for distribution to receivers on different operating systems.
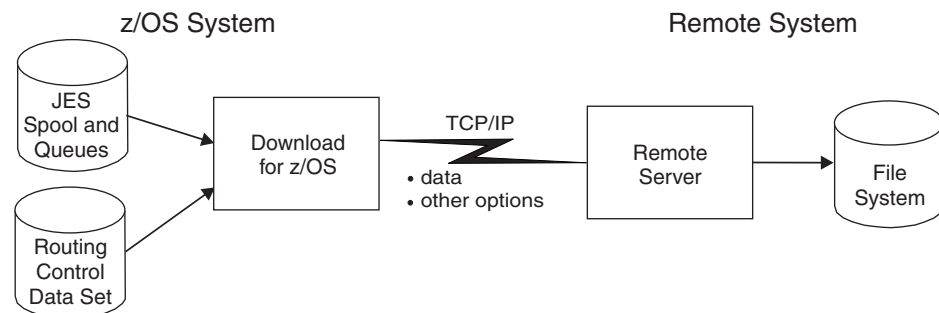
Figure 2. System Overview of Download for z/OS

On the z/OS operating system, Download for z/OS operates as an FSA of the Job Entry Subsystem (JES). The Download for z/OS FSA selects output data sets from the JES spool according to work-selection criteria you define to JES2 or JES3. Several FSAs can run in one functional subsystem (FSS) address space.

Without formatting data for a particular printer, Download for z/OS transmits output data sets to one of several remote systems in the IBM Internet Protocol network according to routing criteria you define to Download for z/OS in a routing-control data set. In the routing-control data set, you specify:
- Routing criteria that correspond to JCL parameters of class, destination, and form name
- The address of the remote system and server to which data sets matching the criteria are to be transmitted

With each data set, Download for z/OS transmits options that contain values the job submitter has specified in JCL parameters; you can specify default values for some of these JCL parameters. For example, you can specify default AFP resource names.

On the remote system, the remote server program saves each data set in one of the file systems that is specified by the system administrator when starting the server program. After saving each data set, the server runs an installation-defined shell or Perl script or exit routine that performs functions that are defined by the installation, such as printing or archiving the files. The server passes a parameter list to the script or exit routine. The parameter list contains JCL parameters that are specified by the job submitter and other job and file information. The script or exit routine can adjust these parameters for PSF or translate them into InfoPrint Manager or Ricoh ProcessDirector printing options or into OnDemand options.

In addition to the exit routine, InfoPrint Manager for Windows supports a destination control file. The destination control file is a user-modifiable file for simpler mapping of JCL to InfoPrint Manager for Windows parameters. The set of InfoPrint Manager for Windows parameters that are generated from the received JCL parameters and mappings in the destination control file is passed to the exit routine.

InfoPrint Manager for AIX supplies sample shell scripts for Download for z/OS; InfoPrint Manager for Windows supplies sample exit routines and destination control files. These shell scripts, exit routines, and destination control files print received files by using the printing options that are specified in the JCL parameters. The AIX or Windows system administrator can create other shell scripts, exit routines, or destination control files.

Client/server relationship

Download for z/OS uses the client/server model for communication between the local z/OS system and the remote systems, as shown in Figure 3 on page 7.

- Download for z/OS running on the local z/OS system is the *client*. Download for z/OS initiates the TCP/IP connection and sends data to the remote server on the remote system.
- The PSF, InfoPrint Manager, Ricoh ProcessDirector, or OnDemand program that is receiving data on the remote system is the *server*.

   Note: InfoPrint Manager for Windows uses the "MVS™ Download receiver" to receive data from Download for z/OS. In this publication, the MVS Download receiver is referred to as a "server".
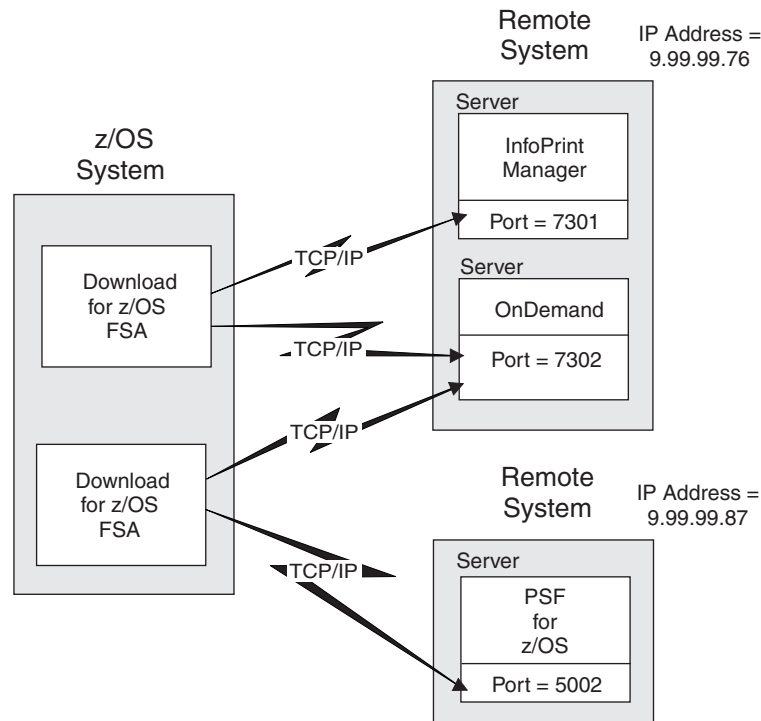
Figure 3. Client/server relationship of Download for z/OS

As shown in Figure 3, a Download for z/OS FSA can transmit data to more than one remote system, although each FSA can transmit only one data set at a time. Any one server can receive data from more than one client, again receiving one data set at a time. Multiple servers can run on the remote system, and servers for InfoPrint Manager and OnDemand can run on the same system.

Note: When running in multiple data set mode with Exit 15, only one Download for z/OS FSA can send jobs to a remote system server.

Each server waits for data at a different socket address. The socket address identifies both the Internet Protocol (IP) address of the remote system and the port number at which the server waits for data.

Download for z/OS initiates a TCP/IP connection to the target server when Download for z/OS has data to transmit and then disconnects after it receives confirmation from the server that the data has been completely transmitted. If requested, both the client and server perform checkpointing of data.

If all data is not completely transmitted, Download for z/OS tries the transmission again at the retry interval and for as many times as you have specified in the routing-control data set. If still unsuccessful, Download for z/OS returns the data set to JES to be held by the system.

Configuration tasks

The tasks for configuring Download for z/OS on the z/OS system are:
1. "Verifying prerequisites and installing Download for z/OS" on page 8
2. "Enabling Download for z/OS in the SYS1.PARMLIB member" on page 8
3. "Planning the Download for z/OS functional subsystem" on page 9

4. "Defining a JES2 functional subsystem" on page 15 or "Defining a JES3 functional subsystem" on page 18

5. "Creating a startup procedure" on page 23

6. "Associating the FSS with a RACF user ID" on page 28

7. "Specifying routing information" on page 29

8. "Writing an installation exit" on page 37, if necessary

9. "Using SMF type 6 records" on page 37, if necessary

10. "Reviewing default program properties table entries" on page 28

The configuration tasks are described in the following sections. See Appendix A, "Checklist of Download for z/OS configuration tasks," on page 79 for a checklist of the configuration tasks.

Verifying prerequisites and installing Download for z/OS

Before you install the Download for z/OS feature tape, ensure that you are at or above these operating system and program levels:

- z/OS Version 1 Release 12.0 or later (Program Number 5694-A01) or z/OS Version 2 Release 1.0 (Program Number 5650-ZOS)
- Communications Server element of z/OS with IP Services
- PSF Version 4 Release 5.0 for z/OS (Program Number 5655-M32)

Ensure that the remote system servers that are receiving data from Download for z/OS are at or above these levels:

- Content Manager OnDemand for Multiplatforms Version 8 Release 5.0 (Program Number 5724-J33), or later
- InfoPrint Manager for AIX Version 4 Release 3.0 (Program Number 5648–F35)
- InfoPrint Manager for Windows Version 2 Release 3.0 (Program Number 5648–F36)
- InfoPrint ProcessDirector for AIX Version 2 Release 4.0 or later (Program Number 5765-H26) or Ricoh ProcessDirector for AIX Version 3 Release 0 or later (Program Number 5765-H30)
- InfoPrint ProcessDirector for Linux Version 2 Release 4.0 or later (Program Number 5765-H27) or Ricoh ProcessDirector for Linux Version 3 Release 0 or later (Program Number 5765-H30)
- InfoPrint ProcessDirector for Windows Version 2 Release 4.0 or later (Program Number 5765-H28) or Ricoh ProcessDirector for Windows Version 3 Release 0 or later (Program Number 5765-H30)
- PSF Version 4 Release 3.0 for z/OS or later with the AFP Download Plus feature

See the *Program Directory for Download for z/OS*, GI10-0283 for instructions about installing the Download for z/OS program.

Enabling Download for z/OS in the SYS1.PARMLIB member

After you install Download for z/OS, ensure that SYS1.PARMLIB contains member IFAPRD*xx* and that Download for z/OS is enabled in the member. Figure 4 on page 9 shows the PRODUCT entry that IFAPRD*xx* must contain for Download for z/OS. Note that the STATE value is set to ENABLED.

```
         PRODUCT OWNER('IBM CORP')
                NAME('PSF for z/OS')
                ID(5655-M32)
                VERSION(*)
                RELEASE(*)
                MOD(*)
                FEATURENAME('Download')
                STATE(ENABLED)
```

Figure 4. PRODUCT entry for Download for z/OS in your IFAPRDxx member of SYS1.PARMLIB

Planning the Download for z/OS functional subsystem

The Download for z/OS feature, like PSF for z/OS, operates as a JES functional subsystem (FSS). An FSS is an extension of JES, which runs in its own address space. For more information about JES functional subsystems, see the *JES Initialization and Tuning Guide* for your system.

Because Download for z/OS performs a very different function from the printer-driver function that is performed by PSF, Download for z/OS operates as a separate FSS, as shown in Figure 5. Even though your installation has already defined one or more FSSs for PSF, you must define a separate FSS for Download for z/OS.
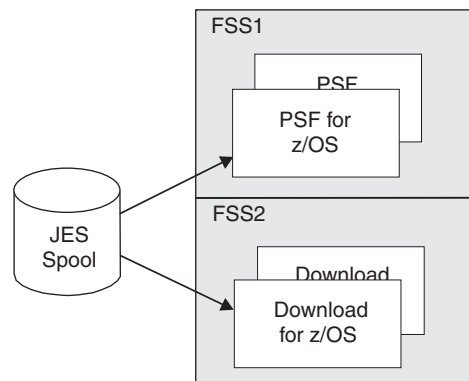
Figure 5. Relationship between PSF and Download for z/OS functional subsystems

Within the FSS defined for Download for z/OS, the Download for z/OS program runs as a functional subsystem application (FSA) and uses the support facilities of the FSS to communicate with JES. Several Download for z/OS FSAs can run in the same FSS.

If you have already defined an FSS and FSA for PSF for z/OS, see "Differences between a PSF for z/OS and Download for z/OS FSS" on page 13. You can modify your existing JES initialization statements and PSF startup procedure to create JES initialization statements for the Download for z/OS FSS and FSA and a Download for z/OS startup procedure.

These sections describe the planning decisions you should consider before coding the JES2 or JES3 initialization statements and writing a startup procedure:
- How many FSSs and FSAs to create
- What region size to define for each FSS
- What JES work-selection criteria to specify for each FSA

- What default checkpoint interval to specify for each FSA
- What default printing options to specify for each FSA

Defining multiple functional subsystems

For improved throughput and more efficient use of system resources, you can define more than one FSA within an FSS. You also can define more than one FSS. Use Table 3 to determine the maximum number of FSSs and FSAs that are supported.

Table 3. Number of FSSs and FSAs supported

Number of FSSs	Number of FSAs per FSS
2000 maximum	128 maximum (see Note)

Note: The actual number of FSAs per FSS might be limited by the amount of storage each Download for z/OS FSA requires below the 16-megabyte line. See "Selecting a region size" to determine how much virtual storage size each FSA requires.

Selecting a region size

The region-size requirements for each Download for z/OS FSS depend on:
- Whether the trace option is active
- The number of FSAs supported by the FSS

Table 4 shows the minimum storage that is required for Download for z/OS. The storage includes all subpools that are associated with each of the Download for z/OS-related task control blocks.

Table 4. Minimum storage required for FSS and FSAs

FSA	Below 16 Megabyte	Above 16 Megabyte
The **first** FSA in an FSS	0.30 MB below 16 MB	5.30 MB above 16 MB
Each **additional** FSA in the FSS	0.02 MB below 16 MB	1.10 MB above 16 MB

An installation option that can affect storage requirements is the size of the trace table. The default is 128 KB per FSA. See *PSF for z/OS: Diagnosis* for more information about tracing.

You specify the amount of below-the-line storage that is required by each Download for z/OS FSA on the EXEC JCL statement of the startup procedure, as described on page 24.

Defining work-selection criteria

You define work-selection criteria for each Download for z/OS FSA during JES initialization. These criteria determine which output data sets the Download for z/OS FSA selects from the JES2 or JES3 spool.

JES2 and JES3 allow you to specify numerous work-selection criteria, which correspond to JCL parameters. See the appropriate *JES Initialization and Tuning Guide* and *JES Initialization and Tuning Reference* for your system for information about the possible criteria. Some work-selection criteria that you might consider for data sets to be processed by Download for z/OS are:

- Output class of the data set
- Form name
- Destination name

Here are some considerations for selecting work-selection criteria:

- Do not specify destination name as a work-selection criterion if job submitters must specify the DEST=IP JCL parameter. This consideration is because job submitters cannot specify a destination name in the DEST JCL parameter when they specify the DEST=IP JCL parameter. See "JCL parameters" on page 55 for information about the DEST=IP parameter.
- In a JES3 environment, specify form name as a work-selection criterion if you specify form name as a selection criterion in the routing-control data set. This consideration is because JES3 does not pass the form name to the Download for z/OS FSA unless you specify form name as a work-selection criterion.

You specify the work-selection criteria for each Download for z/OS FSA on a parameter of a JES initialization statement:

- WS parameter of the JES2 (*nnnn*) statement
- WS parameter of the JES3 DEVICE statement

Requesting checkpointing

When requested, Download for z/OS takes data-set checkpoints at specified intervals during transmission of a data set from the z/OS system to a remote system. At these checkpoints, Download for z/OS requests that both JES and the receiving server record checkpoint data. Checkpointing data enables Download for z/OS to retransmit the data set to the server from the last checkpoint, if a transmission error occurs.

Download for z/OS restarts transmission of a data set from a checkpoint on two occasions:

- When a transmission error occurs, and you requested retry in the routing-control data set
- When Download for z/OS selects a data set that has been previously checkpointed by Download for z/OS

Selecting a checkpoint interval

Download for z/OS supports checkpointing at intervals of a specified number of seconds. If you are familiar with the PSF for z/OS FSA, you know that it supports checkpointing at intervals that are specified in either seconds or number of pages. Because Download for z/OS does not transmit data as pages, Download for z/OS checkpoints in timed intervals only. If you or the job submitter request checkpointing at page intervals, Download for z/OS ignores the request.

Consider these impacts to performance when selecting a checkpoint interval as the system default:

- If the interval number is too low, resulting in many checkpoints, performance might be reduced because of the checkpointing processing that is required.
- If the number of seconds between intervals is too high, retransmission of large amounts of data might reduce performance.

IBM suggests that you request checkpointing as the default to improve performance in the event of transmission errors. A starting interval of 30 seconds is recommended. If you experience very few transmission errors, consider increasing the checkpoint interval.

Specifying the checkpoint default

Checkpointing can be requested in two ways:

- Job submitters request checkpointing for an output data set in the CKPTSEC parameter of the OUTPUT JCL statement.
- You request checkpointing as the default for each Download for z/OS FSA on a parameter of a JES initialization statement:
  - CKPTSEC and CKPTMODE parameters of the JES2 PRT(*nnnn*) statement
  - CKPNTSEC parameter of the JES3 DEVICE statement

Defining default printing options

With each data set it transmits, Download for z/OS transmits parameters that are specified by the job submitter on either the DD or OUTPUT JCL statement. You can specify default values for some of the printing options, namely:

- Data-check blocking option
- Font names (up to four)
- Name of the form definition
- Name of the page definition

In some cases, you might not want to define defaults on the z/OS system:

- If Download for z/OS transmits data sets to an OnDemand server, you do not need to specify defaults for printing.
- If Download for z/OS transmits data sets to an InfoPrint Manager server, the system administrator can specify a default in the shell script, exit routine, or destination control file that is run by the server or in some other manner.
- If Download for z/OS transmits data sets to a Ricoh ProcessDirector server, the administrator can specify defaults in the job type that is used to process jobs received from Download for z/OS.

Specifying defaults in JES2

You can specify defaults for printing options on JES2 initialization statements PRINTDEF and PRT(*nnnn*) and on the PRINTDEV statement of the FSS startup procedure.

To specify *no* defaults in a JES2 environment, code the JES2 and PRINTDEV statements as shown in Table 5.

Table 5. Specifying no defaults in JES2

Option	PRT(*nnnn*) Statement	PRINTDEF Statement	PRINTDEV Statement
Data Check Blocking	Not applicable	Not applicable	Omit DATACK parameter
Fonts	UCS=0	Omit NIUCS parameter	Omit CHARS parameter
Form Definition	Not applicable	Not applicable	Omit FORMDEF parameter
Page Definition	Omit FCB parameter	Omit NIFCB parameter	Omit PAGEDEF parameter

Specifying defaults in JES3

You can specify defaults on JES3 initialization statements (OUTSERV and DEVICE) and on the PRINTDEV statement of the FSS startup procedure.

To specify *no* defaults in a JES3 environment, code the JES3 and PRINTDEV statements as shown in Table 5 on page 12.

Table 6. Specifying no defaults in JES3

Option	DEVICE Statement	OUTSERV Statement	PRINTDEV Statement
Data Check Blocking	Not applicable	Not applicable	Omit DATACK parameter
Fonts	Specify PDEFAULT CHARS and omit CHARS parameter	Omit CHARS parameter	Omit CHARS parameter
Form Definition	Not applicable	Not applicable	Omit FORMDEF parameter
Page Definition	Specify PDEFAULT FCB and omit CARRIAGE parameter	Omit CARRIAGE parameter	Omit PAGEDEF parameter

Differences between a PSF for z/OS and Download for z/OS FSS

The FSS for Download for z/OS is similar to the FSS you might already have defined for PSF for z/OS. Thus, you can use similar JES initialization statements to define the Download for z/OS FSS and FSAs, and your Download for z/OS startup procedure can be similar to the existing PSF startup procedure. You must give the Download for z/OS FSS and FSAs different names and make modifications in these areas:

- JES work-selection criteria
- Checkpointing
- Printer options
- Printing defaults
- Startup procedure

JES work-selection criteria

You must specify different JES work-selection criteria for the Download for z/OS FSA than for the PSF for z/OS FSA. For example, if class A is the criterion for the PSF for z/OS FSA, specify a different class or a different work-selection criterion, such as destination, for the Download for z/OS FSA.

Checkpointing

Specify checkpointing by seconds rather than pages because Download for z/OS only supports checkpointing by seconds:

- In JES2, specify the CKPTSEC parameter instead of CKPTPAGE. Also, specify the CKPTMODE=SEC parameter.
- In JES3, specify the CKPNTSEC parameter instead of CKPNTPG.

Printer options

You can use several JES parameters to specify printer-specific options. Because these parameters do not apply to a Download for z/OS FSA, remove these parameters from the JES2 or JES3 initialization statement:

JES2 PRT(*nnnn*) Statement	JES3 DEVICE Statement
BURST	BURST
COPYMARK	COPYMARK
FLASH	FEATURES
MARK	FLASH
NPRO	HEADER
SEP	NPRO
SEPDS	STACKER
UNIT	XTYPE
	XUNIT

See "Defining a JES2 functional subsystem" on page 15 or "Defining a JES3 functional subsystem" on page 18 for the JES parameters that apply when you define an FSS and FSAs for Download for z/OS.

Printing defaults

When you define an FSA, you can specify defaults for several printing options. However, to transmit a data set to an AIX or Windows operating system for either printing or archiving, you might not want to specify defaults on the z/OS operating system. See "Defining default printing options" on page 12 for more information.

The file names of resources, such as page definitions, form definitions, and fonts, are case-sensitive on the AIX and Linux operating systems. Because resource names specified in JCL statements, JES statements, or in the startup procedure, are all translated to uppercase characters, ensure that the file names on the AIX or Linux operating system are also in uppercase. This recommendation is not a concern on Windows operating systems because the file names of AFP resources are not case-sensitive.

Startup procedure

The startup procedure must specify a different program entry point for Download for z/OS and include a DD statement for the routing-control data set. The PRINTDEV statement is optional, and many of the parameters on the PRINTDEV statement do not apply. See "PRINTDEV parameters" on page 25 for the PRINTDEV parameters that do apply.

Considerations for configuring TCP/IP

Download for z/OS uses TCP/IP to send the print data to a remote server, such as InfoPrint Manager, and supports IPv4 and IPv6. TCP/IP configuration parameters, in addition to other network considerations, can affect how fast data is sent. For information about tuning on TCP/IP see *TCP/IP: Performance Tuning Guide*. For Download for z/OS, also check the recommendations that are listed in *PSF for z/OS: Customization*.

IBM suggests that you use a TCPSENDBFRSIZE buffer size of 32768 or more. You can specify TCPSENDBFRSIZE on the TCPCONFIG statement in the hlq.PROFILE.TCPIP data set. See *z/OS Communications Server: IP Configuration Reference* for information about the TCPCONFIG statement and the PROFILE.TCPIP search order.

Defining a JES2 functional subsystem

To define an FSS for Download for z/OS in a JES2 environment, code these JES2 initialization statements as part of JES2 initialization:
- One FSS(*fss_name*) statement to define each FSS
- One PRT(*nnnn*) statement for each FSA under control of the FSS

In addition to the FSS(*fss_name*) and PRT(*nnnn*) statements, these JES2 initialization statements have considerations for Download for z/OS:
- On the JES2 SPOOLDEF statement, specify TRKCELL=5 for improved performance. Also, specify TRKCELL=YES on the PRT(*nnnn*) statement.
- On the JES2 OUTCLASS statement, specify BLNKTRNC=NO if you do not want JES2 to truncate trailing blanks for data sets in an output class that Download for z/OS processes. The setting of this parameter can affect the formatting of the printed output. The default is BLNKTRNC=YES, which can cause problems with Mixed Object Document Content Architecture (MO:DCA) data.

Sample JES2 initialization statements

Figure 6 shows sample JES2 statements for one FSS named DOWNLOAD and one associated FSA named PRT0001.

```
FSS(DOWNLOAD) PROC=APSWAFPD,HASPFSSM=HASPFSSM,AUTOSTOP=YES

PRT(0001)  CKPTSEC=30,CLASS=R,START=NO,
           FSS=DOWNLOAD,MODE=FSS,PRESELCT=YES,
           PRMODE=(LINE,PAGE,SOSI1,SOSI2),
           TRKCELL=YES,UCS=0,WS=(Q)
```

Figure 6. Sample JES2 initialization statements. These statements are commonly found in the initialization-deck member of SYS1.PARMLIB. Continuation characters are not shown.

"FSS(fss_name) statement" describes the JES2 initialization statements that are shown in Figure 6, including some additional parameters that you might want to specify for a Download for z/OS FSS and FSA.

Note: For detailed descriptions of each of the parameters, see *z/OS JES2 Initialization and Tuning Reference*.

FSS(fss_name) statement

The FSS(*fss_name*) initialization statement is optional but recommended. If you omit it, JES2 generates a default FSS when an FSA is started.

Each FSS must have a unique name, which is specified as a 1 - 8 character name. In the example, the FSS name is DOWNLOAD. This FSS name must match the FSS name in the PRT(*nnnn*) statement for each associated FSA.

The FSS statement contains these parameters for Download for z/OS:

PROC=*procedure_name*
> Specifies the name of the procedure for starting this FSS. This parameter is required.

AUTOSTOP={YES | NO}
> Specifies whether the FSS address space is to be stopped automatically if all FSAs under control of the FSS are stopped.

This parameter is optional; if you omit it, the default is NO.

HASPFSSM= <u>HASPFSSM</u>
> Specifies the JES load module to be installed in the FSS address space.
>
> This parameter is optional. For Download for z/OS, either omit the parameter or specify the default value of HASPFSSM.

PRT(nnnn) statement

A PRT(*nnnn*) statement is required to define each FSA. *nnnn* is 1 - 4 numeric characters. Each FSA must have a unique name, which is specified as PRT(*nnnn*). In addition to the PRT(*nnnn*) format, Download for z/OS accepts the PRINT*nn* and PRINTER*n* formats.

The PRT(*nnnn*) statement contains these parameters:

CKPTMODE={<u>PAGE</u> **|** **SEC}**
> Specifies whether checkpointing is to be based on the number of pages (PAGE) or on time (SEC). For Download for z/OS, specify CKPTMODE=SEC because Download for z/OS checkpoints only at timed intervals.
>
> This parameter is optional. If you omit CKPTMODE but specify the CKPTSEC parameter, with or without CKPTPAGE, Download for z/OS checkpoints by time. If you omit the CKPTMODE and the CKPTSEC parameters, Download for z/OS does *not* checkpoint unless requested by the job submitter.

CKPTSEC={*nnnnn* **|** <u>0</u>**}**
> Specifies the number of seconds to elapse between checkpoints of a data set being transmitted to the remote system. The value must be from 0 - 32767. This value does *not* cause checkpointing during printing on the remote system. The recommended starting value is 30 seconds.
>
> This parameter is optional. If you omit it, the default is 0, meaning that Download for z/OS does not checkpoint data sets unless the job submitter specifies a checkpoint value on the OUTPUT JCL statement for the data set.

{CLASS | QUEUE}=(*classes***)**
> Specifies the output classes that are processed by this FSA. List all classes to be selected by this FSA; do not separate each class with a comma. If you designate CL or Q as a work-selection criterion on the WS parameter, the FSA selects data sets whose class matches one of the values that is specified here.
>
> This parameter is optional. If you omit it and do not specify CL or Q as a work-selection criterion, this FSA selects data sets with any output class.

FCB=*pagedef_name*
> Specifies the 1- to 4-character name of a default page definition. Do *not* code the P1 prefix of the page definition; Download for z/OS adds the P1 prefix when passing the name of the page definition to the remote system. This name is translated to uppercase.
>
> This parameter is optional. If you omit it, JES2 determines the default page definition from the NIFCB parameter of the JES2 PRINTDEF statement. If no default is specified on the PRINTDEF statement, the default is that specified on the PRINTDEV statement in the FSS startup procedure.

FORMS=(*form_names***)**
> Specifies the 1- to 8-character form names processed by this FSA. List one to eight different form names that can be selected by this FSA; separate each form name with a comma.

If you designate F as a work-selection criterion on the WS parameter, the FSA selects data sets whose form name matches one of the values that is specified here.

This parameter is optional. If you omit it and do not specify F as a work-selection criterion, this FSA selects data sets with any form name.

FSS=_fss_name_
Specifies the name of the FSS associated with this FSA. This parameter is required.

MODE=FSS
Specifies that the FSA is managed by an FSS. This parameter is optional. The default is FSS if you code the FSS parameter.

PRESELCT={YES | NO}
Specifies whether output data sets are preselected for this FSA. This parameter is optional. If you omit it, the default is YES.

PRMODE=(_processing_modes_**)**
Specifies the data-set processing modes that are supported by this FSA. Separate the modes with commas. List all PRMODE values to be accepted by this FSA, because the FSA processes only data sets with a mode that matches one of the values that is specified in this parameter:

LINE   Specifies that data sets containing line data are selected.

PAGE   Specifies that data sets containing MO:DCA-P data are selected.

SOSI_n_   Specifies that data sets with the shift-out/shift-in processing mode of SOSI1, SOSI2, or SOSI3 for double-byte fonts are selected.

installation-defined
                    Specifies any mode that your installation has defined.

Specify both LINE and PAGE for FSAs that are to transmit both types of data sets.

This parameter is optional. If you omit it, the default is LINE.

ROUTECDE=(_destinations_**)**
Specifies the destinations that are processed by this FSA. List one to four different destination names that can be selected by this FSA; separate each destination name with a comma. If you designate R as a work-selection criterion on the WS parameter, the FSA selects data sets whose destination matches one of the values that is specified here.

This parameter is optional. If you omit it and do not specify R as a work-selection criterion, this FSA selects data sets with any destination.

START={YES | NO}
Specifies whether JES2 is to automatically start this FSA whenever JES2 starts. If you specify START=NO, the operator must start the FSA.

This parameter is optional. If you omit it, START=YES is the default.

TRKCELL={YES | NO}
Specifies whether track-cell despooling is to be used with this FSA. You specify the size of the track cell, in terms of buffers, in the TRKCELL parameter of the JES2 SPOOLDEF statement. For improved performance, IBM suggests that you specify TRKCELL=YES on this statement and TRKCELL=5 on the JES2 SPOOLDEF statement.

This parameter is optional. If you omit it, the default is NO.

UCS={*font_name* | 0}
Specifies the 1- to 4-character default font name. 0 specifies that no default font is passed to Download for z/OS.

This parameter is optional. If you omit it, JES2 determines the default font from the NIUCS parameter of the PRINTDEF statement or, if NIUCS is not specified, from the PRINTDEV statement of the startup procedure.

WS=(*work_selection_criteria*)
Specifies the work-selection criteria for this FSA; separate each value with a comma. See the *z/OS JES2 Initialization and Tuning Reference* for the valid values and defaults. For a Download for z/OS FSA, consider these values:

Q	Specifies that the FSA selects only those data sets with the same class as specified in the CLASS or QUEUE parameter of this statement.
R	Specifies that the FSA selects only those data sets with the same destination name as specified in the ROUTECDE parameter of this statement. If job submitters must specify the DEST=IP JCL parameter, do not specify this work-selection parameter. This recommendation is because job submitters cannot specify a destination name in the DEST JCL parameter when they specify the DEST=IP JCL parameter. See "JCL parameters" on page 55 for information about the DEST=IP parameter.
F	Specifies that the FSA selects only those data sets with the same form name as specified in the FORMS parameter of this statement.

This parameter is optional but recommended. If you omit it, the FSA selects output data sets for processing according to default work-selection criteria.

Defining a JES3 functional subsystem

To define an FSS for Download for z/OS in a JES3 environment, code these JES3 initialization statements as part of the JES3 initialization processing for the z/OS system:
- One FSSDEF statement to define each FSS
- One DEVICE statement to define each FSA under control of the FSS

Sample JES3 initialization statements

Figure 7 shows sample JES3 statements for one FSS named DOWNLOAD and one associated FSA named PRT0001.

```
FSSDEF,FSSNAME=DOWNLOAD,PNAME=APSWAFPD,TYPE=WTR

DEVICE,CARRIAGE=(YES,6),CHARS=(YES,60D8),
       CKPNTSEC=30,DTYPE=PRTAFP1,
       FSSNAME=DOWNLOAD,
       JNAME=PRT0001,JUNIT=(,SYS1,UR,ON),
       MODE=FSS,PM=(LINE,PAGE,SOSI1,SOSI2),
       WC=(R),WS=(CL)
```

Figure 7. Sample JES3 initialization statements. These statements are commonly found in the initialization-deck member of SYS1.PARMLIB. Continuation characters are not shown.

"FSSDEF statement" describes the JES3 initialization statements that are shown in Figure 7 on page 18, including some additional parameters that you might want to specify to define a Download for z/OS functional subsystem.

Note: For detailed descriptions of each of the parameters, see *z/OS JES3 Initialization and Tuning Reference*.

FSSDEF statement

The FSSDEF initialization statement is optional but recommended. If you omit it, JES3 generates a default FSS when an FSA is started. The FSSDEF statement contains these parameters for Download for z/OS:

FSSNAME=`fss_name`
> Specifies the name of this FSS. Each FSS must have a unique 1- to 8-character name. This FSS name must match the FSS name in the DEVICE statement for each associated FSA.
>
> This parameter is required.

MSGDEST={`msgdest` **| 42 | JES |** `nnn`**}**
> Specifies routing information for messages about this FSS. This parameter is optional; if you omit it, the default is 42.

PNAME=`procedure_name`
> Specifies the name of the procedure for starting this FSS.

SYSTEM=`system_name`
> Specifies the JES3 processor on which the FSS runs. This parameter is optional. JES determines the default from the DEVICE statement.

TERM={YES | NO}
> YES specifies that the FSS stops if the JES3 global address space is stopped by a *RETURN or *DUMP operator command. This parameter is optional; if you omit it, the default is NO.

TYPE=WTR
> Specifies that the FSS is an output writer. This parameter is required.

DEVICE statement

A DEVICE statement is required to define each FSA. The DEVICE statement contains these parameters:

CARRIAGE=({YES | NO},`pagedef_name`**)**
> Specifies the JES default page definition.
>
> **YES** Specifies that the page definition can be changed during FSA processing.
>
> **NO** Specifies that the page definition cannot be changed during FSA processing.
>
> *pagedef_name*
>> Specifies the 1- to 4-character name of the page definition be used as a default. Do *not* code the P1 prefix of the page definition; Download for z/OS adds the P1 prefix when passing the page definition name to the remote system.
>
> This parameter is optional. If you omit it, JES3 determines the default page definition from the CARRIAGE parameter of the JES3 OUTSERV initialization

statement. If you omit the CARRIAGE parameter in the OUTSERV statement, the default is 6, that is, page definition P16. If you do not want JES3 to supply a default page definition to Download for z/OS, specify the PDEFAULT FCB parameter.

CHARS=({YES | NO},_font_name_**)**
Specifies a 1- to 4-character default font name. NO specifies that no default font is passed to Download for z/OS.

This parameter is optional. If you omit it, JES3 determines the default font from the CHARS parameter of the JES3 OUTSERV initialization statement. If you omit the CHARS parameter of the OUTSERV statement, the default is GS10. If you do not want JES3 to supply a default font value to Download for z/OS, specify the PDEFAULT CHARS parameter.

CKPNTSEC=_nnnnn_
Specifies the number of seconds to elapse between checkpoints of a data set being transmitted to the remote system. The value must be from 1 - 32767. This value does *not* cause checkpointing during printing on the remote system. The recommended starting value is 30 seconds.

This parameter is optional; if not specified, Download for z/OS does not checkpoint data sets unless the job submitter specifies a checkpoint value on the OUTPUT JCL statement for the data set.

DGROUP=_destination_name_
Specifies a 1- to 8-character destination name that is processed by this FSA. If you designate destination as a work-selection criterion on the WS parameter, this FSA selects data sets that match the value that is specified here.

This parameter is optional. Specify this parameter only if you specify destination as a work-selection criteria on the WS parameter.

DTYPE=PRTAFP1
Specify PRTAFP1 as the device type for a Download for z/OS FSA. This parameter is required.

DYNAMIC={YES | NO}
Specifies whether JES3 is to start and stop this FSA dynamically.

YES   Specifies that JES3 is to start this FSA whenever work is available for it. JES3 stops this FSA, and deactivates the address space when no work is available.

NO   Specifies that the operator is to start and stop this FSA. Specify NO to keep the address space active between transmission of data sets.

This parameter is optional. If you omit it, the default is NO.

FORMS=({YES | NO},_form_name_**)**
Specifies the form name that is processed by this FSA.

NO   Specifies that the form name cannot be changed during FSA processing.

YES   Specifies that the form name can be changed during FSA processing.

_form_name_
Specifies the 1- to 8-character name of the form to be processed by this FSA. If you designate FORMS as a work-selection criterion on the WS parameter, the FSA selects data sets whose form name matches the value that is specified here.

This parameter is optional. If you omit it and do not specify forms as a work-selection criteria, this FSA selects data sets with any form name.

FSSNAME=_fss_name_

Specifies a unique FSS associated with this FSA. This value must match the value that is coded for the FSSNAME parameter in the corresponding FSSDEF statement.

This parameter is optional. If you omit it, the default is the name of this FSA, as specified in the JNAME parameter.

JNAME=_fsa_name_

Specifies the unique 1- to 8-character name of this FSA. This parameter is required.

JUNIT=(_devnum_,_main_,_msgdest_**[,{ON | OFF}])**

Specifies:

devnum	For Download for z/OS, do _not_ specify a device address; use a comma as a position holder.
main	The name of the processor to which the device is attached.
msgdest	Routing information messages about the FSA.
ON | **OFF**	Specifies whether the device is initially online or offline.

This parameter is required.

PDEFAULT={NONE | CHARS | FCB | CHARS,FCB}

Specifies whether JES3 is to use certain JES3 default values during FSS processing or ignore them. If JES3 ignores the default values, Download for z/OS uses default values for CHARS, PAGEDEF, or both, that are defined in the PRINTDEV statement. See "PRINTDEV parameters" on page 25 for information about the PRINTDEV statement.

NONE	Specifies that JES3 is to use JES3 default values for font name (UCS or train) and page definition name (FCB or CARRIAGE); Download for z/OS does not use the CHARS and PAGEDEF values that are specified in the PRINTDEV statement.
CHARS	Specifies that JES3 is to ignore the JES3 default value for font name (UCS or train); Download for z/OS uses the CHARS value that is specified in the PRINTDEV statement when the WS=U parameter is specified on the DEVICE statement.
FCB	Specifies that JES3 is to ignore the JES3 default value for page definition name (FCB or CARRIAGE); Download for z/OS uses the PAGEDEF value that is specified in the PRINTDEV statement when the WS=C parameter is specified on the DEVICE statement.
CHARS,FCB	Specifies that JES3 ignores the JES3 defaults for both font name (UCS or train) and page definition name (FCB or CARRIAGE); Download for z/OS uses the PRINTDEV value for CHARS when the WS=U parameter is specified on the DEVICE statement and the PRINTDEV value for PAGEDEF when the WS=C parameter is specified on the DEVICE statement.

This parameter is optional. The default is NONE.

MODE=FSS

Specifies that this FSA is managed by an FSS. This parameter is required.

PM=(_processing_modes_**)**
> Specifies the data-set processing modes that are supported by this FSA. Separate the modes with commas. List all PRMODE values to be accepted by this FSA because the FSA processes only data sets with a mode that matches one of the values that is specified in this parameter:

> **LINE**   Specifies that line-format data sets are selected.

> **PAGE**   Specifies that composed-page data sets are selected.

> **SOSI**_n_   Specifies that data sets with the shift-out/shift-in processing mode of SOSI1, SOSI2, or SOSI3 for double-byte fonts are selected.

> _installation-defined_
> > Specifies any mode that your installation has defined.

> This parameter is optional. If you omit it, the default is LINE,PAGE.

WC=(_classes_**)**
> Specifies the output classes that are processed by this FSA. List all classes to be selected by this FSA; separate each class with a comma. If you designate CLASS as a work-selection criterion on the WS parameter, this FSA selects data sets that match the values that are specified here.

> This parameter is optional. If you omit it, this FSA selects data sets with any output class.

WS=(_work_selection_criteria_**)**
> Specifies the work-selection criteria for this FSA; separate each value with a comma. See the _z/OS JES3 Initialization and Tuning Reference_ for the valid values and the default.

> For a Download for z/OS FSA, consider these values:

> **C**   Causes JES3 to pass the FCB name that is specified on the OUTPUT JCL statement to the FSA.

> **CL**   Specifies that the FSA selects only those data sets with the same class as specified in the WC parameter of this statement.

> **D**   Specifies that the FSA selects only those data sets with the same destination name as in the DGROUP parameter of this statement. If job submitters must specify the DEST=IP JCL parameter, do not specify this work-selection parameter. This recommendation is because job submitters cannot specify a destination name in the DEST JCL parameter when they specify the DEST=IP JCL parameter. See "JCL parameters" on page 55 for information about the DEST=IP parameter.

> **F**   Causes JES3 to pass the form name that is specified as a JCL parameter to the Download for z/OS FSA. If you specify form names as selection criteria in the routing-control data set, also specify this parameter so that the Download for z/OS FSA can inspect the form name.

> **U**   Causes JES3 to pass the font name that is specified as a JCL parameter to the FSA.

> **Notes:**

> 1. This parameter is optional but recommended. If you omit it, the FSA selects output data sets for processing according to default work-selection criteria.

2. If you want Download for z/OS to use the FCB that is specified in the FCB JCL parameter to format output, specify WS=C as one of the work-selection criteria. Otherwise, JES3 does not pass the FCB name that is specified in JCL to the FSA.

3. If you want Download for z/OS to use the page definition that is specified in the PAGEDEF (or FCB) JCL parameter, specify WS=C as one of the work-selection criteria. Otherwise, JES3 does not pass the page definition name that is specified in JCL to the FSA.

4. If you want Download for z/OS to use the font that is specified in the CHARS (or UCS) JCL parameter, specify WS=U as one of the work-selection criteria. Otherwise, JES3 does not pass the font name that is specified in JCL to the FSA.

Creating a startup procedure

Before starting a Download for z/OS FSS, you must create a cataloged startup procedure. The startup procedure identifies:

- Program name, region size, timeout value, and tracing parameters.
- Location of the routing-control data set. You can specify a different routing-control data set for each FSS.
- Defaults for printing with InfoPrint Manager, Ricoh ProcessDirector, or PSF, such as page and form definitions, fonts, and data-check option. You can define different defaults for each FSA. See "Defining default printing options" on page 12 for more information about defining defaults to JES.

Include the startup procedure in a library that is known to either JES2 or JES3. See the appropriate *JES Initialization and Tuning Guide* for your installation for more information about procedure libraries.

Sample startup procedure

Figure 8 shows a sample Download for z/OS startup procedure for an FSS with one FSA. The same sample procedure is provided in SYS1.PROCLIB.

The JES2 initialization statements for this FSS are shown in Figure 6 on page 15; the JES3 initialization statements are shown in Figure 7 on page 18. The startup procedure name is APSWAFPD and the FSA name is PRT1.

```
//APSWAFPD PROC
//STEP01   EXEC PGM=APSKAFPD,REGION=4M,TIME=NOLIMIT,PARM=(,INTR)
//ROUTFILE DD DISP=SHR,DSN=MVSDLOAD.ROUT.FILE
//PRT1     CNTL
//PRT1     PRINTDEV CHARS=(60D8),      /* DEFAULT FONT SET         */
//             PAGEDEF=V06483,         /* PAGEDEF DEFAULT          */
//             FORMDEF=A10110,         /* FORMDEF DEFAULT          */
//             DATACK=UNBLOCK,         /* REPORT ALL DATA-CHECK    */
//             TRACE=YES               /* TURN INTERNAL TRACE ON   */
//PRT1     ENDCNTL
```

Figure 8. Sample startup procedure

Notes:

1. This sample JCL assumes that the Download for z/OS programs are in a data set that is part of the standard system search order; if not, include a STEPLIB statement to identify the data set.

2. To use Exit 15 Print Parameters exit routine, include a STEPLIB statement to
   identify the data set containing the exit, unless the data set is part of the
   standard system search order.

Startup procedure JCL statements

This section describes the statements and parameters that are shown in Figure 8 on
page 23.

proc_name **PROC**

Names a cataloged procedure. *proc_name* must match the procedure name in a
JES initialization statement for this FSA:
* PROC parameter of the JES2 FSS(*fss_name*) statement
* PNAME parameter of the JES3 FSSDEF statement

label **EXEC PGM=APSKAFPD [,REGION=***nnnn***{K | M}] [,TIME=NOLIMIT]**
[,PARM=(*FSSddname***,{INTR | FULL})]**

Starts the Download for z/OS program. This statement is required.

PGM=APSKAFPD

Specifies the Download for z/OS program entry point.

REGION=*nnnn***{K | M}**

Specifies the amount of storage, above-the-line and below-the-line,
required by this FSS. Value range: 0 - 9999 K or 0 - 2047 M, where:
K   Kilobytes
M   Megabytes

See "Selecting a region size" on page 10 for more information.

TIME=NOLIMIT

Specifies TIME=NOLIMIT to prevent TIMEOUT abends.

PARM=(*FSSddname***,{INTR | FULL})**

Specifies tracing values. See "Using the PSF trace facility" on page 73
for more information about tracing.

FSSddname	Specifies the name of a DD statement that defines the output data set in which to record FSS trace output. For information about allocating this data set, see "Allocating an FSS trace data set" on page 75.
INTR	Specifies an internal trace. To start an internal trace during FSS initialization, also specify TRACE=YES on the PRINTDEV statement; because TRACE=YES is the default, you can omit the TRACE=YES parameter. INTR is the default value.
FULL	Specifies an FSA full external trace. To start a full external trace during FSS initialization, also specify TRACE=YES on the PRINTDEV statement; because TRACE=YES is the default, you can omit the TRACE=YES parameter.

For a complete list of tracing values you can specify on the PARM
parameter, see *PSF for z/OS: Diagnosis*.

ROUTFILE DD DISP=SHR,DSN=*data_set_name*

Specifies the routing-control data set that Download for z/OS uses to transmit
data sets to a remote system and server. Specify DISP=SHR to allow more than
one FSS to access this data set.

This DD statement is required.

fsa_name **CNTL**

Specifies the beginning of optional program control statements for a Download for z/OS FSA. Repeat the CNTL, PRINTDEV, and ENDCNTL statements for each FSA under control of the FSS.

fsa_name

Specifies the FSA name. The FSA name on the CNTL statement must match the label on the subsequent PRINTDEV and ENDCNTL statements. The name must match the FSA name that is specified in a parameter of the JES initialization statement for this FSA:
- The name of the JES2 PRT(*nnnn*) statement
- The JNAME parameter of the JES3 DEVICE statement

This statement is optional. Specify CNTL, PRINTDEV, and ENDCNTL statements only if you want to specify PRINTDEV parameters.

fsa_name **PRINTDEV** *parameters*

Specifies default printing parameters, turns tracing on or off, and requests a conditional memory dump.

fsa_name

Specifies the FSA name.

parameters

See "PRINTDEV parameters" for a description of the PRINTDEV parameters.

This statement is optional.

fsa_name **ENDCNTL**

Specifies the end of the program control statements for the FSA.

fsa_name

Specifies the FSA name.

This statement is optional.

PRINTDEV parameters

PRINTDEV parameters allow you to define default printing options for all data sets transmitted by an FSA. You can also set internal PSF tracing on or off and request a conditional memory dump. The PRINTDEV parameters are:

CHARS=(*font_names***)**

Specifies up to four font names that Download for z/OS is to transmit to the remote system for each data set if the job submitter does not specify a CHARS or UCS value. Each font name must be from 1- to 4-characters and separated by commas. The font names are translated to uppercase. This parameter is optional.

In a JES2 environment, if you specify this parameter, do not specify other default values during JES2 initialization in the UCS or NIUCS parameters; if you specify other default values to JES2, Download for z/OS transmits the JES2 default value.

In a JES3 environment, if you specify this parameter, also specify the PDEFAULT CHARS parameter in the DEVICE statement for the FSA; if you do not specify the PDEFAULT parameter, Download for z/OS transmits the JES3 default value.

Example:

```
CHARS=(60D8)
```

DATACK={BLOCK | UNBLOCK | BLKCHAR | BLKPOS}
Specifies the data-check exceptions the printer reports to the remote print server.

BLOCK   Specifies that the printer does not report data-check exceptions.

UNBLOCK   Specifies that the printer does report all data-check exceptions.

BLKCHAR   Specifies that the printer does not report character exceptions that are not valid. (The printer reports only print-positioning exceptions.)

BLKPOS   Specifies that the printer does not report print-positioning exceptions. (The printer reports only character exceptions that are not valid.)

This parameter is optional. If you omit it, Download for z/OS does not transmit a default data-check option to the remote system.

Example:

```
DATACK=UNBLOCK
```

DUMP=([*reason_code* | ABD0*nnnn*][,*msgid*,*count*])
Specifies a conditional memory dump of the FSS address space when a reason code, restartable abend, or message occurs. See "Using the PSF dump facility" on page 76 and see *PSF for z/OS: Diagnosis* for more information about this parameter.

This is an optional parameter. If you omit it, no conditional dump occurs.

Example:

```
DUMP=(,APS994I,1)
```

FORMDEF=*formdef_name*
Specifies a default form definition. Omit the F1 prefix from the name of the form definition. The name of the form definition is translated to uppercase.

This is an optional parameter. If you omit it, Download for z/OS does not transmit the name of a default form definition to the remote system.

Example:

```
FORMDEF=A10110
```

NORESP={NOTIFY | NOTIFY(*node.userid*) | NOTIFY(OPERATOR) | TERMINATE}
Specifies the action that Download for z/OS takes when the time specified by the RESPTIME parameter expires before a response is received from the remote server.

NOTIFY
Download for z/OS notifies JES that an expected response was not received from the remote server. This condition is also displayed by SDSF.

NOTIFY(*node.userid*)
Download for z/OS sends a message to the specified user ID indicating that an expected response was not received from the remote server. The node and period can be omitted if the user ID is on the node on which Download for z/OS is running. Download for z/OS also notifies JES of the missing response.

NOTIFY(OPERATOR)
>   Download for z/OS sends a message to the system operator that
>   indicates that an expected response was not received from the remote
>   server. Download for z/OS also notifies JES of the missing response.

TERMINATE
>   Download for z/OS stops the FSA. The system operator must enter a
>   command to restart the FSA. The data set that is active when the FSA
>   is stopped is then restarted from the last checkpoint.

Notes:

1. The NORESP parameter is only effective with TCP/IP after the TCP/IP
   session has been established and Download for z/OS is sending the header
   or data to the remote server.

2. When the RESPTIME parameter is specified, the NORESP parameter must
   also be specified to tell Download for z/OS what action to take when no
   response is received within the time specified.

3. The NORESP parameter does not apply to delays Download for z/OS
   encounters while trying to create a TCP/IP session with the IPADDR and
   PORTNO specified in the routing-control data set.

Example:

```
NORESP=NOTIFY
```

PAGEDEF=_pagedef_name_

Specifies a page definition name that Download for z/OS is to transmit to the
remote system for each data set if the job submitter does not specify an FCB or
PAGEDEF value. Omit the P1 prefix from the name of the page definition. The
name of the page definition is translated to uppercase. This parameter is
optional.

In a JES2 environment, if you specify this parameter, do not specify another
default value during JES2 initialization in the FCB or NIFCB parameters; if you
specify another default value to JES2, Download for z/OS transmits the JES2
default value.

In a JES3 environment, if you specify this parameter, also specify the
PDEFAULT FCB parameter in the DEVICE statement for the FSA; if you do not
specify the PDEFAULT FCB parameter, Download for z/OS transmits the JES3
default value.

Example:

```
PAGEDEF=V06483
```

RESPTIME=_nnnnn_

Specifies the maximum number of seconds from 0 - 86400 that Download for
z/OS should wait for a response from the remote server. The default is 0,
which means Download for z/OS waits indefinitely for a response.

Notes:

1. The remote server might run ACIF on the entire job and spool the entire
   job before responding to the end-of-file request. Therefore, allow enough
   time for large jobs to be sent to the remote server.

2. The RESPTIME parameter is only effective with TCP/IP after the TCP/IP
   session has been established and Download for z/OS is sending the header
   or data to the remote server.

3. When the RESPTIME parameter is specified, the NORESP parameter must also be specified to tell Download for z/OS what action to take when no response is received within the time specified.

4. The RESPTIME parameter does not apply to delays Download for z/OS encounters while trying to create a TCP/IP session with the IPADDR and PORTNO specified in the routing-control data set.

Example:
```
RESPTIME=180
```

TRACE={YES | NO}

Specifies whether Download for z/OS is to record trace data starting at initialization. Download for z/OS performs the trace that is specified in the PARM parameter. If you do not specify the PARM parameter on the EXEC statement, Download for z/OS records internal trace data only. See Chapter 5, "Diagnosing errors in Download for z/OS," on page 73 for more information about using traces.

This is an optional parameter. If you omit it, the default is YES.

Example:
```
TRACE=YES
```

Associating the FSS with a RACF user ID

In order for Download for z/OS to access resources that are protected by RACF, you must update either the RACF STARTED class or the started procedures table to associate each Download for z/OS FSS with a RACF user ID that has read access to the resources. This user ID must have an OMVS segment, a home directory, an associated user identifier (UID), and a default group that has an OMVS segment with a group identifier (GID). For more information, see *z/OS Security Server RACF Security Administrator's Guide* and *z/OS Security Server RACF System Programmer's Guide*.

Reviewing default program properties table entries

z/OS supplies an internal default program properties table (PPT) entry for Download for z/OS. The internal default values are:

```
PPT     PGMNAME(APSKAFPD)
        KEY(1)
        NOSWAP
        NOPRIV
        CANCEL
        SYST
        NODSI
        PASS
        AFF(NONE)
        NOPREF
```

These are the recommended values and no changes are required. However, you can change them by specifying a PPT entry in the SCHEDxx member in the system PARMLIB with overriding values for APSKAFPD. For more details, see *z/OS MVS Initialization and Tuning Reference*. Modification of any values other than NODSI might cause a JES abend, or other unexpected results to occur.

Specifying NODSI (nonexclusive use of data sets) in the PPT lets other programs, such as OGL and PPFA, change the resources while Download for z/OS is running. NODSI also lets Data Management functions occur, such as compression

and library migration. However, these functions can cause problems for Download for z/OS if they run while Download for z/OS is active. Therefore, you must manually exclude Download for z/OS resource libraries from the Data Management functions. If you do not want to manually exclude the resource libraries, you should use DSI in the PPT entry.

Specifying DSI and running Download for z/OS with DISP=SHR causes other programs to wait until Download for z/OS no longer has the resource libraries open. Therefore, DSI prevents programs from updating or changing the resource libraries while Download for z/OS is active.

Specifying routing information

Download for z/OS uses installation-defined routing criteria to determine a remote system and server for each data set. You define routing criteria and the associated remote systems and servers in a routing-control data set accessible to Download for z/OS on the z/OS system.

Download for z/OS transmits an output data set to only one server. To transmit an output data set to more than one system or server, the job submitter must specify multiple OUTPUT JCL statements, which creates multiple output data sets. On each OUTPUT statement, the job submitter must specify different routing criteria, corresponding to the different target servers.

Defining routing criteria

The routing criteria that you specify correspond to the following JCL parameters, which the job submitter specifies on either the DD or OUTPUT statements:
- CLASS - output class
- DEST - destination
- FORMS - form name

You can specify these routing criteria individually or as a set. For example, suppose you want to route data sets to different servers running Download for z/OS on different systems. You might define class and destination values as shown in Table 7.

Table 7. Sample routing criteria

Criteria	System	Server
CLASS=1 and DEST=PSF6000	AIX system 1	InfoPrint Manager for AIX server
CLASS=1 and DEST=ONDEMAND	AIX system 1	OnDemand server
CLASS=2 and DEST=PSF6000	AIX system 2	InfoPrint Manager for AIX server
CLASS=2 and DEST=ONDEMAND	AIX system 2	OnDemand server
CLASS=2 and DEST=IPMWIN	Windows system 1	InfoPrint Manager for Windows server
CLASS=3 and DEST=PSFZOS	z/OS system 1	PSF for z/OS server with the AFP Download Plus feature

The class and destination values that are shown are only examples. You might want to define simple routing criteria that match the JCL values already specified

by the job submitters. For example, if data sets to be transmitted to a particular server are submitted with a unique output class, specify that output class as the routing criterion for that server.

Defining socket addresses

You identify each target server running Download for z/OS by the socket address at which the server waits for data. The socket address identifies both:
- The IP address of the remote host
- The port number through which the target server communicates with TCP/IP

The administrator of the remote system assigns the socket address by using port numbers that are not reserved or used by other applications on the target system. The valid range of port numbers is: 5002 - 64000, except 8251 and 8253, which are not allowed. Also, avoid 6874 - 6889, which InfoPrint Manager uses for other purposes, and 15080, which Ricoh ProcessDirector uses.

Download for z/OS running on the local z/OS system must use the *same* port number as the remote host server when they are communicating with each other:
- On a PSF AFP Download Plus receiver, the system administrator specifies the port number of the server when starting the server. The commands to start the server (**apshhrcd**) are described in *PSF for z/OS: AFP Download Plus*.
- On InfoPrint Manager for AIX, the system administrator specifies the port number of the server when starting the server. The commands to start the InfoPrint Manager for AIX server are described in *InfoPrint Manager for AIX: Procedures*.
- On InfoPrint Manager for Windows, the system administrator specifies the port number of the server when configuring the receiver. Information about configuring the MVS Download receiver on InfoPrint Manager for Windows is described in *InfoPrint Manager for Windows: Procedures*.
- On Ricoh ProcessDirector, the system administrator specifies the port number of the server when configuring the receiver. Information about configuring the receiver on Ricoh ProcessDirector is described in the Ricoh Production Print Information Center at http://rpp.ricoh-usa.com/help/index.jsp.
- On OnDemand, the system administrator specifies the port number of the server when starting the server. The commands to start the OnDemand server are described in *IBM DB2 Content Manager OnDemand for Multiplatforms: Installation and Configuration Guide*.

Allocating the routing-control data set

If you have defined more than one Download for z/OS FSS, you can create a different routing-control data set for each FSS. You identify the routing-control data set when you start each FSS.

The routing-control data set is a sequential file with:
- Record format (RECFM) of fixed block
- Logical record length (LRECL) of 80

The name of the DD statement that identifies the data set must be ROUTFILE. See the description of the ROUTFILE DD statement on page 24.

Sample routing-control data set

SYS1.SAMPLIB contains a basic routing-control data set in member APSWRCF. You can copy the APSWRCF sample to a sequential data set and modify it for your

installation. Figure 9 shows this routing-control data set.

```
DEST=destid,                    /* Matching criterion - destination
CLASS=q,                        /* Matching criterion - class
IPADDR=hostaddr,                /* Target IP address or host name
PORTNUM=nnnn;                   /* Target port number
```

Figure 9. Routing-control data set in SYS1.SAMPLIB

Figure 10 shows a sample routing-control data set with two routing statements and optional parameters. The values that are shown are for example only and are not recommended values.

```
/******** Name of the TCP/IP Address Space **************************************
TCPNAME=TCPIP;
/******** Routing Criteria #1 **************************************************
CLASS=QR,                 /* All data sets with CLASS of Q or R
DEST=PSF6000,             /* and with destination PSF6000
IPADDR=dept01.mysystem    /* Transmit to remote system at this address
PORTNUM=5002,             /* Transmit to the server at this port number
RETRYNUM=3,               /* Try the transmission again 3 times if transmission fails
RETRYINTV=60;             /* Wait 60 seconds before trying again
/******** Routing Criteria #2 **************************************************
CLASS=QR,                 /* All data sets with CLASS of Q or R
FORMS=BILLS,              /* and with form name BILLS
     RECEIPTS,            /* or form name RECEIPTS
IPADDR=9.99.201.35,       /* Transmit to the remote system at this address
PORTNUM=7302,             /* Transmit to the server at this port number
RETRYNUM=3,               /* Try the transmission again 3 times if transmission fails
RETRYINTV=60;             /* Wait 60 seconds before trying again
```

Figure 10. Sample routing-control data set

Routing control statements

You code two types of control statements in the routing-control data set:
- One TCP/IP statement. The TCP/IP statement identifies the name of the TCP/IP address space in the z/OS system.
- Multiple routing statements. Each routing statement associates a set of routing criteria with the socket address of a remote target system and server.

  Typically, you would define one routing statement for each server; however, if you want to route data sets with varying combinations of criteria to the same server, you can code more than one statement per server.

The TCP/IP statement contains one parameter:

TCPNAME=_tcpip_name_**;**
Specifies the 1- to 8-character job name of the TCP/IP address space. Typically the job name is TCPIP, but it might have been changed by your installation.

This statement is optional. If you omit it, the default is TCPIP.

Figure 11 on page 32 summarizes the parameters of a routing statement.

```
[CLASS=classes]
[DEST=destination_names]
[FORMS=form_names]
 IPADDR=host_address
[LOGJOBS={YES | NO}]
 PORTNUM=port_number
[RETRYINTV={retry_interval | 10}]
[RETRYNUM={number_of_retries | 1}]
[SEND_REC_LENGTH={YES | NO}]
[YEAR_FORMAT=YY | YYYY]
```

Figure 11. Parameters of the routing statement

The parameters of the routing statement are:

CLASS=classes

> Specifies up to eight class values. Each class is one-alphanumeric character. Do *not* separate the class values by commas. Download for z/OS compares each value that is specified to the value on the CLASS parameter of the DD or OUTPUT JCL statement.
>
> This parameter is optional; however, if you do not specify CLASS, you must specify either DEST or FORMS, or both. If you omit CLASS, Download for z/OS ignores the output class that is specified on the DD or OUTPUT JCL statement.
>
> **Example:**
>
>> CLASS=QR

DEST=destination _names

> Specifies up to eight destination names, separated by commas. Each destination name is 1- to 8-characters. Download for z/OS compares each value that is specified to the value on the DEST parameter of the DD or OUTPUT JCL statement.
>
> This parameter is optional; however, if you do not specify DEST, you must specify either CLASS or FORMS, or both. If you omit DEST, Download for z/OS ignores the destination specified on the DD or OUTPUT JCL statement.
>
> **Example:**
>
>> DEST=AIX1,AIX2

FORMS=form_names

> Specifies up to eight form names, separated by commas. Each form name is 1- to 8-alphanumeric characters. Download for z/OS compares each value that is specified to the value on the FORMS parameter of the DD or OUTPUT JCL statement.
>
> This parameter is optional; however, if you do not specify FORMS, you must specify either CLASS or DEST, or both. If you omit FORMS, Download for z/OS ignores the form name that is specified on the DD or OUTPUT JCL statements.
>
> **Example:**
>
>> FORMS=BILLS,RECEIPTS

IPADDR=host_address

> Specifies the address of the remote system. Specify one of these:
> • Host name with these restrictions:

- The name can be a maximum of 72 characters long.
- These characters are not allowed: , / = ? ;
- Dotted decimal address in the format *nnn.nnn.nnn.nnn*
- Colon hexadecimal address in the format

  `X'nnnn':X'nnnn':X'nnnn':X'nnnn':X'nnnn':X'nnnn':X'nnnn':X'nnnn'`

  with these restrictions:
  - Leading zeros in each hexadecimal value can be omitted. For example: `2001:db8:85a3:0:0:8a2e:c22:384e`
  - One sequence of repeat zero values can be omitted. For example: `2001:db8:85a3::8a2e:c22:384e`
  - The last two hexadecimal digits can be in dotted decimal notation. For example: `2001:db8:85a3::8a2e:12.34.56.78`

This parameter is required.

Examples:

```
IPADDR=denver.mysystem
IPADDR=20.97.8.201
IPADDR=69DC:8864:FFFF:FFFF:0C22:1280:8C0A:FFFF
```

LOGJOBS={YES | NO}

Specifies whether a message is logged for jobs that are successfully sent to the receiving server or canceled by the operator. When YES is specified, message APS988I is logged in the SYSLOG data set for each job that is successfully sent or message APS993I is logged for each canceled job.

This parameter is optional. If you omit it, the default is NO.

Example:

```
LOGJOBS=YES
```

PORTNUM=*port_number*

Specifies the port number of the target server. This port number must not be used by other applications in the target system and must match the port number specified on the command that is used to start the server. The valid range of port numbers is: 5002 - 64000, except 8251 and 8253, which are not allowed. Avoid 6874 - 6889, which InfoPrint Manager uses for other purposes, and 15080, which Ricoh ProcessDirector uses.

This parameter is required.

Example:

```
PORTNUM=6001
```

RETRYINTV={*retry_interval* | 10}

Specifies the number of seconds before trying again. Specify a number from 0 - 99999. The retry interval is the amount of time Download for z/OS waits after issuing an error message (such as APS989I) before trying to re-establish the TCP/IP connection. The retry interval is in addition to any TCP/IP timeout or retries that are done before the error message is issued.

This parameter is optional. If you omit it, the default is 10, meaning that Download for z/OS tries the transmission again after 10 seconds have passed.

Notes:

1. IBM suggests that you do not specify a long retry interval because Download for z/OS does not process another data set until all retries have been attempted.

2. The retry interval can be 30 seconds longer than expected when you use IBM TCP/IP and the CONNECT command fails.

Example:

```
RETRYINTV=60
```

RETRYNUM={*number_of_retries* **| 1}**

Specifies the maximum number of times Download for z/OS is to try a failed transmission again. Specify a number from 0 - 999. If, after the specified number of retries, the transmission is still unsuccessful, Download for z/OS releases the data set to JES to be held by the z/OS system. Download for z/OS issues an error message for each transmission attempt that fails, including the original attempt and each retry failure. Any retries done by TCP/IP are not counted.

This parameter is optional. If you omit it, the default is 1, meaning that Download for z/OS tries a failed transmission again one time.

Note: IBM suggests that you do not specify numerous retries because Download for z/OS does not process another data set until all retries have been attempted.

Example:

```
RETRYNUM=3
```

SEND_REC_LENGTH={YES | NO}

Specifies whether each record is to be prefixed with a length field.

Specify YES if the target server is a print server, such as InfoPrint Manager for AIX. Specify NO *only* if MO:DCA-P documents are being transmitted to an OnDemand server, because MO:DCA-P records already contain a record length. The AFP Conversion and Indexing Facility (ACIF), for example, creates MO:DCA-P documents. Specifying NO might improve performance for OnDemand applications.

This parameter is optional. If you omit it, the default is YES.

Example:

```
SEND_REC_LENGTH=NO
```

YEAR_FORMAT=YY | YYYY

Specifies the format of the year portion of the file name that Download for z/OS generates. The generated file name has this general format:

MVS_system.jobname[*.step_name*]*.form_name.yyddd.hhmmsstuvwx*

or

MVS_system.jobname[*.step_name*]*.form_name.yyyyddd.hhmmsstuvwx*

See "Locating transmitted files on remote file systems" on page 45 for a complete description of the file name format.

If you specify YY, the year is represented as 2 digits, such as 99 or 01. If you specify YYYY, the year is represented as 4 digits, such as 1999 or 2001.

This parameter is optional. If you omit it, the default is YYYY, which represents the year as 4 digits.

The YEAR_FORMAT keyword setting applies to all new data sets that Download for z/OS transmits. Any data set that was partially transmitted and

checkpointed is retransmitted by using the original file name. The current setting of YEAR_FORMAT does not affect the file name for these data sets.

If you specify more than one of the three routing parameters (that is, CLASS, DEST, or FORM) on one routing statement, data sets must match *all* of the specified parameters to be routed to the associated server.

Syntax rules

Follow these rules when coding routing-control statements:

- Code all parameters in uppercase. Also, code parameter values, except for the TCP/IP host name, in uppercase. The TCP/IP host name can contain uppercase and lowercase characters.
- Code each parameter on a separate line.
- End each parameter with a comma, unless the parameter is the last in the statement.
- End the last parameter of a routing statement with a semi-colon.
- Do not include blanks in a statement, except for leading and trailing blanks on a line. For example, do not include blanks before or after an equal sign, or before a comma or a semi-colon,
- Begin each comment with: /*
- Comments do not need to end with */
- Code a comment on a separate line or after the parameter.
- Do *not* put either sequence numbers or column 72 continuation characters in the routing control file data set.

Carefully review the values that you specify. Download for z/OS checks the validity of the parameter names, but does not check the validity of the values that are specified.

Hierarchy of statements

A data set to be routed might meet the routing criteria of several control statements in the routing-control data set. In this event, Download for z/OS selects the routing-control statement to use according to the following hierarchy:

1. The first statement with matching DEST, CLASS, and FORMS values.
2. The first statement with matching DEST and CLASS, but with no FORMS parameter specified.
3. The first statement with matching DEST and FORMS, but with no CLASS parameter specified.
4. The first statement with matching CLASS and FORMS, but with no DEST parameter specified.
5. The first statement with matching DEST, but with no CLASS or FORMS parameter specified.
6. The first statement with matching CLASS, but with no DEST or FORMS parameter specified.
7. The first statement with matching FORMS, but with no DEST or CLASS parameter specified.

Figure 12 on page 36 illustrates the hierarchy of control statements.

```
/**** Route data sets with destination PSF01 or PSF02 *************
DEST=PSF01,PSF02,      /* Data sets with destination PSF01 or PSF02
CLASS=Q,               /* and class Q
IPADDR=1.2.3.4,        /* Route to remote system with this IP address
PORTNUM=5555;          /* Route to server at this port number
/**** Route data sets with any destination ************************
CLASS=Q,               /* Data sets with class Q
IPADDR=5.6.7.8,        /* Route to remote system with this IP address
PORTNUM=7777;          /* Route to server at this port number
```

Figure 12. Sample hierarchy of routing-control data set

Download for z/OS first uses routing statements with the most criteria:

- If the job submitter specifies destination PSF01 or PSF02 for a data set in class Q, Download for z/OS transmits the data set to the IP address and port number in the first statement.

  A data set with destination PSF01 or PSF02 and class Q also satisfies the criteria in the second routing statement; however, Download for z/OS uses the first routing statement because the first statement specifies more matching criteria.

- If the job submitter specifies a destination other than PSF01 or PSF02 or does *not* specify a destination for a data set in class Q, Download for z/OS transmits the data set to the IP address and port number in the second statement.

Testing the routing-control data set

After you have created the routing-control data set, start one Download for z/OS FSA to check the parameter names. The Download for z/OS FSA checks the parameter names during initialization and sends error messages to the JES console. To check the IP addresses and port numbers, transmit at least one data set to each server.

Figure 13 shows a sample routing-control data set and JCL for a job that uses the IEBGENER utility to create an output data set. The SYSUT2 DD statement in the example specifies output class R to transmit the output data set to the system whose address is specified in the routing-control data set.This example assumes that class R is also defined as a JES work-selection criterion for the Download for z/OS FSA.

```
/**** Routing-Control Data Set for Download ************************************
TCPNAME=TCPIP;
/**** Route Data Sets with Class R To Remote System ***************************
CLASS=R,               /* All data sets with class R
IPADDR=9.99.12.30,     /* Transmit to remote system with this IP address
PORTNUM=5002,          /* Transmit to server at this port number
RETRYNUM=3,            /* Try the transmission again 3 times if transmission fails
RETRYINTV=600;         /* Wait 600 seconds before trying again
/**** End of Routing-Control Data Set *****************************************
//TEST     JOB ...
//STEP1    EXEC  PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSIN    DD DUMMY
//SYSUT2   DD SYSOUT=R
//SYSUT1   DD *
This is a test of the routing-control data set.
```

Figure 13. Routing-control data set and JCL to transmit a data set to a remote system

Modifying the routing-control data set

You can modify the contents of the routing-control data set while Download for z/OS FSAs are running. However, to use the modified routing-control data set, you must stop the Download for z/OS FSS and restart each FSA under its control. See Chapter 3, "Operating Download for z/OS" for information about how to stop the Download for z/OS FSS and restart the FSAs.

Writing an installation exit

PSF provides Print Parameters Exit 15, which you can use to transmit more job information to PSF, InfoPrint Manager, or Ricoh ProcessDirector servers. For information about Exit 15, see *PSF for z/OS: Customization*.

Using SMF type 6 records

Download for z/OS writes a System Management Facility (SMF) type 6 accounting record for each data set it processes. Download for z/OS writes a record even if an error prevents transmission of any data; for example, Download for z/OS writes a record even if a routing entry cannot be found. If Download for z/OS releases the data set to the system and then processes the same data set again, Download for z/OS writes another SMF record for the data set.

If you have accounting programs that process SMF records, you might need to modify them to handle Download for z/OS records. The layout of the record is the same as the SMF type 6 record for PSF, with an additional file-transfer section that contains the number of bytes transmitted. Note, however, that Download for z/OS does not provide any information about the number of pages that are transmitted to or printed on the remote system.

Download for z/OS writes these sections:
* Base section, except for the SMF6PGE field
* Common section, except for the SMF6OTOK field
* Enhanced SYSOUT Support (ESS) section
* File-transfer section

See *PSF for z/OS: Customization* or *z/OS MVS System Management Facilities (SMF)* for the format of the SMF type 6 record for PSF.

Note: Download for z/OS does *not* support a user exit to allow modification of the SMF record.

Field SMF6PAD1 indicates whether the file-transfer section is present, as shown in Table 8.

Table 8. SMF type 6 record—Section Indicator Field

Offsets	Name	Length	Format	Description	
61 3D	SMFPAD1	1	binary	**Bit**	**Meaning**
				4	File-transfer section present.

The file-transfer section for Download for z/OS has the format that is shown in Table 9 on page 38.

Table 9. SMF type 6 File-Transfer Section

Offsets	Name	Length	Format	Description
0 0	SMF6LN6	2	binary	Length of file-transfer section, including this field.
2 2	SMF6BYTE	4	binary	This field contains the total number of bytes that Download for z/OS transmitted or attempted to transmit. If Download for z/OS tried a transmission attempt again, this field contains the total number of bytes in all retry attempts. If Download for z/OS detected an error and did not attempt to transmit any data, this field contains 0. If the total number of bytes transmitted is greater than or equal to 4 gigabytes (GB), this field contains X'FFFFFFFF'.
6 6	SMF6IPV4	4	binary	Formatted IPv4 address of the target system.
10 A	SMF6FTL	1	binary	Level indicator for file-transfer section. This field contains X'02'.
11 B		37		Reserved.
48 30	SMF6HWRD	4	binary	This field contains the high word of the total number of bytes that Download for z/OS transmitted or attempted to transmit. If Download for z/OS tried a transmission attempt again, this field contains the high word of the total number of bytes in all retry attempts. If Download for z/OS detected an error and did not attempt to transmit any data, this field contains 0. If the total number of bytes transmitted is less than 4 GB, this field contains 0.
52 34	SMF6LWRD	4	binary	This field contains the low word of the total number of bytes that Download for z/OS transmitted or attempted to transmit. If Download for z/OS tried a transmission attempt again, this field contains the low word of the total number of bytes in all retry attempts. If Download for z/OS detected an error and did not attempt to transmit any data, this field contains 0. If the total number of bytes transmitted is less than 4 GB, this field contains the total number of bytes transmitted or attempted to transmit.
56 38	SMF6IPV6	16	binary	Formatted IPv6 address of the target system.

Chapter 3. Operating Download for z/OS

This chapter describes how to operate the Download for z/OS functional subsystem (FSS) and the functional subsystem applications (FSAs) that are under its control, including how to:
- Start the Download for z/OS FSS and associated FSAs.
- Cancel the current activity on a Download for z/OS FSA.
- Stop the Download for z/OS FSS and associated FSAs.
- Monitor the status of data transmission.
- Display the record count of the data set that is currently being transmitted.
- Display the status of a TCP/IP connection.
- Locate data sets that have been transmitted to remote systems.

You operate a Download for z/OS FSS and FSA just as you operate a PSF for z/OS FSS and FSA, or any other JES output writer. For more information about the JES2 and JES3 commands that are described in this chapter and additional JES commands that you can use to manage an FSA, see *z/OS JES2 Commands* or *z/OS JES3 Commands*. For more information about the MVS commands described in this chapter, see *z/OS MVS System Commands*.

Although this chapter shows only MVS and JES commands, you can also use System Display and Search Facility (SDSF) commands or the commands of a comparable product to start and stop FSAs and to display and cancel data sets. See *z/OS SDSF Operation and Customization* for more information about SDSF commands.

Starting the Download for z/OS functional subsystem

Before you start a Download for z/OS functional subsystem (FSS) and the functional subsystem applications (FSAs) under its control, your installation must:
- Define a Download for z/OS FSS
- Define one or more Download for z/OS FSAs under control of the FSS
- Create a cataloged start procedure for each FSS

These tasks are described in Chapter 2, "Configuring Download for z/OS."

After these tasks are accomplished, you can enter commands at the operator console to start each Download for z/OS FSA. You do not need to enter a special command to start the FSS because JES starts the FSS automatically when you start the first FSA under control of that FSS.

In JES2, if the FSA was defined with the START=YES parameter on the JES2 PRT(*nnnn*) statement, JES2 automatically starts the FSA when you turn on the z/OS system. JES3 does not support the automatic start option.

Starting a Download for z/OS FSA requires some coordination with TCP/IP and the servers on the AIX, Linux, or z/OS operating system or the receivers on the Windows operating system. The steps for starting a Download for z/OS FSA are:
1. Verify that TCP/IP is started on the z/OS operating system. You can start TCP/IP by entering this MVS command:

   S *tcpip_name*

Replace *tcpip_name* with the job-name of the TCP/IP address space. The job-name of the address space is TCPIP, unless changed by your installation.

2. Ensure that the communications controller between the local z/OS operating system and the remote system is varied online.

3. Verify that the receiving servers with Download for z/OS on the remote system are started. See these publications for instructions:

   - *IBM DB2 Content Manager OnDemand for Multiplatforms: Installation and Configuration Guide*
   - *InfoPrint Manager for AIX: Procedures*
   - *InfoPrint Manager for Windows: Procedures*
   - *Ricoh ProcessDirector for AIX: Planning and Installing*
   - *Ricoh ProcessDirector for Linux: Planning and Installing*
   - *Ricoh ProcessDirector for Windows: Planning and Installing*
   - *PSF for z/OS: Customization* or *PSF for z/OS: AFP Download Plus*.

   You can start the server *after* you start the FSA; however, you should start the server before the FSA attempts to transmit any data to that server; otherwise, a TCP/IP error occurs.

   Note: The command that is used to start a server, or the configuration of the receiver on InfoPrint Manager for Windows, designates the port number at which the server receives data from Download for z/OS. This port number must match the port number that is defined for that server in the routing-control data set. If the port numbers do not match, a TCP/IP error might occur when Download for z/OS tries to initiate a connection to the server.

4. Start the Download for z/OS FSA and the FSS by entering this JES2 or JES3 start command:

   JES2:

   ```
   $S fsa_name [,fsa_name ... ]
   ```

   where *fsa_name* is the name of the PRT(*nnnn*) statement, for example, PRT0001.

   JES3:

   ```
   *CALL WTR,OUT=fsa_name
   ```

   where *fsa_name* is the JNAME parameter of the DEVICE statement.

Canceling a data set transmission

Use the JES cancel command to stop the transmission of a data set to the remote system. The data set that is currently being transmitted is removed from the JES spool. If Download for z/OS is not performing checkpointing, the file is also removed from the file system of the remote system; if Download for z/OS is checkpointing, the partial file is saved on file system of the remote system.

Enter this JES2 or JES3 command:

JES2:

```
$C fsa_name [,fsa_name ... ]
```

JES3:

```
*CANCEL fsa_name
```

Stopping a Download for z/OS functional subsystem

You must stop Download for z/OS FSAs and the FSS that controls them when one of these situations occurs:

- The system programmer modifies the routing-control data set used by the FSA. If you want an FSA to use the modified data set, you must stop all FSAs under control of the FSS and also stop the FSS before restarting.
- An error requires that you restart the FSS. You must stop the FSAs and also stop the FSS before restarting.

Before stopping the Download for z/OS FSS, you must stop each FSA under its control. You can stop an FSA after it finishes transmitting the current data set to the remote system, or you can stop it immediately.

Stopping an FSA after the current data set is transmitted

Use these JES2 or JES3 commands to stop the FSA *after* transmission of the current data set is complete:

JES2:

```
$P fsa_name [,fsa_name ... ]
```

JES3:

```
*VARY,fsa_name [,fsa_name ... ],OFFLINE
*CANCEL,fsa_name
```

The *VARY command makes the FSA unavailable for transmitting data sets but allows the current data set to finish. The *CANCEL command stops the FSA.

Stopping an FSA immediately

Use these JES2 or JES3 commands to stop a Download for z/OS FSA immediately:

JES2:

```
$C fsa_name [,fsa_name ... ]
$P fsa_name [,fsa_name ... ]
```

The $C command cancels the current data set. The $P command stops the FSA after the current data set is canceled. If the current data set cannot be canceled, the FSA does not stop. You can use the MVS Cancel command to stop the FSA in this case.

JES3:

```
*CANCEL,fsa_name,T
```

The *CANCEL command cancels the current data set; the T option stops the FSA after the current data set is canceled. If the current data set cannot be canceled, the FSA does not stop. You can use the MVS Cancel command to stop the FSA in this case.

Stopping the FSS

Before stopping an FSS, you should stop all FSAs under its control, as described in "Stopping an FSA after the current data set is transmitted" and "Stopping an FSA immediately."

In a JES2 environment, if the FSS was configured with the AUTOSTOP=YES option on the JES2 FSS(*fss_name*) statement, JES2 stops the FSS automatically after you have stopped all FSAs. If AUTOSTOP=YES was not specified, you must stop the FSS with an MVS operator command.

In a JES3 environment, JES automatically stops the FSS after you stop all FSAs under its control; therefore, you should not need to stop the FSS by using an MVS operator command.

If JES has not automatically stopped the FSS, use this MVS operator command to stop the FSS after you have stopped all FSAs under its control.

```
C fss_name
```

Replace the *fss_name* with:
- In JES2, the name on the FSS(*fss_name*) statement
- In JES3, the name in the FSSNAME parameter of the FSSDEF statement

Monitoring data set transmission

Download for z/OS issues messages to the console when errors occur during transmission.

Download for z/OS also issues a message to the SYSLOG data set when a data set has been transmitted to a remote system, and if the user requested notification on the NOTIFY keyword of the OUTPUT JCL statement.

Displaying current activity

In a JES2 environment, you can use the SDSF printer display command to display the total and running record count of the data set that is currently being transmitted by a Download for z/OS FSA. Note that SDSF displays the status of the Download for z/OS FSA only if the Download for z/OS feature is performing checkpointing. See "Requesting checkpointing" on page 11 for more information on checkpointing.

Displaying TCP/IP status

You can use the PSF operator interface to dynamically display the status of a TCP/IP connection on the console and system log. For information about using the PSF operator interface, see *PSF for z/OS: Diagnosis*.

To display TCP/IP status, type the MODIFY (or F) command with the DISPLAY and STATUS=TCPIP parameters. The syntax of the command is:

```
{MODIFY | F}  fss_name,DISPLAY,[fsa_name],STATUS=TCPIP
```

The display TCP/IP status command is the same as the display TCP/IP status command for PSF. For more information about the command parameters, see *PSF for z/OS: Diagnosis*.

Figure 14 on page 43 shows a sample of the TCP/IP status output displayed on the system log with the APS699I message when the MVS MODIFY command is entered with the DISPLAY and STATUS=TCPIP parameters.

```
   F WTRES600,DISPLAY,PRT619,STATUS=TCPIP
   APS639I  WTRES600 WTRES600 ***  COMMAND (DISPLAY) ACCEPTED.
   APS699I  TCP/IP   DISPLAY   STATUS 645
                                                        PENDING
   FSANAME.......... TCP/IP STATUS...................... COMMANDS.....
   PRT619  READY      TCP/IP IS ACTIVE
                      DESTINATION CONNECTED
```

Figure 14. Status output displayed on the system log (sample)

The TCP/IP status output displayed on the console and system log consists of a primary TCP/IP status and might consist of one or two sub-statuses and a pending command. The primary TCP/IP statuses, sub-statuses, and pending commands that might be displayed on the console and system log are described in Table 10.

Table 10. TCP/IP status, sub-status, and pending command descriptions

TCP/IP Status Type	Description
Primary Status	
INITIALIZING TCP/IP	Download for z/OS is in the process of initializing the TCP/IP interface. Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. Additional messages have already been or will be issued describing the problem in more detail. See "Note" on page 45.
TCP/IP IS ACTIVE	Download for z/OS has created a TCP/IP session with the remote server. This is the normal status when a job is being sent to the remote server.
TCP/IP IS INACTIVE	No TCP/IP session exists between Download for z/OS and the remote server. This is the normal state when Download for z/OS is not sending a job to the remote server because a new session is created for each job.
TERMINATING TCP/IP	Download for z/OS is in the process of stopping the TCP/IP interface. Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. Additional messages have already been or will be issued describing the problem in more detail. See "Note" on page 45.
Sub-Status	
TCP/IP INTERFACE CONNECTED	When Download for z/OS is initializing the TCP/IP interface, this sub-status indicates that SOCKET has successfully completed. Issue the MODIFY command again and if the same TCP/IP status is displayed, there is most likely a problem with the interface. See "Note" on page 45.
DESTINATION CONNECTED	When TCP/IP is active, this sub-status indicates that CONNECT has successfully completed. This is the normal sub-status for the TCP/IP interface when a job is being sent to the remote server.
READY	This sub-status indicates that Download for z/OS is connected to the remote server.
Pending Command	
CLOSE	Issue the MODIFY command again and if the CLOSE command is still pending, there is most likely a problem with the interface. See "Note" on page 45.

Table 10. TCP/IP status, sub-status, and pending command descriptions (continued)

TCP/IP Status Type	Description
CONNECT	Whenever this command is pending, Download for z/OS is unable to connect with the remote server. Wait 10 minutes for a possible TCP/IP timeout. An APS989I message either has already been issued or will be issued with more details, including the TCP/IP error number (errno) received. See "Note" on page 45.
FREEADDRINFO	Issue the MODIFY command again and if the FREEADDRINFO command is still pending, there is most likely a problem with the interface.
GETADDRINFO	Issue the MODIFY command again and if the GETADDRINFO command is still pending, there is most likely a problem with the interface.
INITAPI	Issue the MODIFY command again and if the INITAPI command is still pending, there is most likely a problem with the interface. See "Note" on page 45.
IOCTL	Issue the MODIFY command again and if the IOCTL command is still pending, there is most likely a problem with the interface. See "Note" on page 45.
PTON	Issue the MODIFY command again and if the PTON command is still pending, there is most likely a problem with the interface.
RECV	Issue the MODIFY command again and if the RECV command is still pending, there is most likely a problem with the interface. See "Note" on page 45.
SELECT-READ	Select was issued for a Read operation. Whenever this command is pending, Download for z/OS is waiting for a response from the remote server. Some remote servers do not acknowledge the job until the job has been transformed. This might be a normal state indicating that the remote server is processing the job. However, this might indicate that an error has occurred at the remote system. Refer to error messages in the remote system logs, and then determine if the remote server needs more file system space or needs to be restarted.
SELECT-WRITE	Select was issued for a Write operation. Whenever this command is pending, Download for z/OS is waiting to send data to the remote server. Issue the MODIFY command again and if the SELECT-WRITE command is still pending, there is most likely a problem with the interface; for example, the TCP/IP buffers might be full. See "Note" on page 45.
SEND	Issue the MODIFY command again and if the SEND command is still pending, there is most likely a problem with the interface; for example, the TCP/IP buffers might be full. See "Note" on page 45.
SHUTDOWN	Issue the MODIFY command again and if the SHUTDOWN command is still pending, there is most likely a problem with the interface. See "Note" on page 45.
SOCKET	Issue the MODIFY command again and if the SOCKET command is still pending, there is most likely a problem with the interface. See "Note" on page 45.

Table 10. TCP/IP status, sub-status, and pending command descriptions (continued)

TCP/IP Status Type	Description
TERMAPI	Issue the MODIFY command again and if the TERMAPI command is still pending, there is most likely a problem with the interface. See "Note."

Note: If the problem is only occurring on one TCP/IP-attached destination, it is most likely a remote server problem. If the problem is occurring on all or multiple TCP/IP-attached destinations, it is most likely a problem with TCP/IP and you should contact your TCP/IP administrator.

Locating transmitted files on remote file systems

To locate a data set that has been successfully saved on the target system, the user can examine the files on the remote file system that is designated to receive data sets from Download for z/OS. Note, however, that the server receiving data from Download for z/OS might have deleted the data set from the file system after processing it.

The file name of each data set successfully saved on a remote file system has this format:

`MVS_system.jobname[.step_name].form_name.yyyyddd.hhmmsstuvwx.ARD|PRD|...`

or

`MVS_system.jobname[.step_name].form_name.yyddd.hhmmsstuvwx.ARD|PRD|...`

where:

`MVS_system`
Specifies the identifier of the z/OS system.

`jobname`
Specifies the name of the job on the z/OS system.

`step_name`
Specifies the step name of the job on the z/OS system. If a step name does not exist, this field does not appear in the data set name.

`form_name`
Specifies the form name that is specified on the DD or OUTPUT JCL statement, or the form name that is defined as the JES system default.

`yyyyddd`
Specifies the four-digit year and day of transmission.

`yyddd`
Specifies the two-digit year and day of transmission. The year is specified as 2 digits when the YEAR_FORMAT option has been set to YY in the routing entry that is used to transmit this data set.

`hhmmsstuvwx`
Specifies the time of transmission in hours, minutes, seconds, tenths of a second, hundredths of a second, thousandths of a second, 10-thousandths of a second, and hundred-thousandths of a second.

`ARD | PRD | ...`
Identifies the type of file. ARD is a suffix that is used by the OnDemand server to identify the data file; PRD is used by InfoPrint Manager, Ricoh ProcessDirector, and PSF servers to identify the data file received. Suffixes such

as JCL (for job attributes), cntl (for checkpoint), js, and log are used for other information that is needed to create the final print job. You can use a suffix that is not listed here if necessary.

Note: To simplify file name processing on remote systems, Download for z/OS removes these special characters from created file names:

| & ; < > ( ) $ ` \ " ' @ * ? # ~ =

Figure 15 shows the files that Download for z/OS transmitted to the remote system from 11:05 to 11:41 a.m. on the 115th day of 2001.

```
SRV7.MULTIDS2.STEP1.STD.2001115.11094632139.PRD
SRV7.MULTIDS2.STEP2.STD.2001115.11094667956.PRD
SRV7.SIMPLE.STEP1.STD.2001115.11053227648.PRD
SRV7.SIMPLE1.STEP1.STD.2001115.11410871155.PRD
```

Figure 15. Examples of Files Transmitted by Download for z/OS

Chapter 4. Using Download for z/OS for printing or archiving

This chapter describes how a job submitter uses job control language (JCL) to direct a data set to Download for z/OS. Download for z/OS then transmits the data set to remote system servers, such as InfoPrint Manager for AIX. If you are printing with PSF, InfoPrint Manager, or Ricoh ProcessDirector you should be familiar with concepts of Advanced Function Presentation (AFP), such as form definitions, page definitions, and fonts. See *PSF for z/OS: User's Guide* for an introduction to AFP and the JCL used to print with PSF for z/OS.

Understanding data stream support

Download for z/OS transmits all types of data streams, performing no modification of the data except to optionally add a record length field if required by the receiving server. You can use Download for z/OS to transmit almost any type of data stream that you can print or archive, including:

MO:DCA-P data
> Data that is already composed into pages, including data placement and presentation information (such as which font to use). Download for z/OS supports MO:DCA Presentation Interchange Set (IS) data streams, including MO:DCA IS/3.

Line data
> Data that is prepared for printing on a line printer without any data placement or presentation information. Includes traditional and record format line data.

Mixed-mode data
> A combination of line data and MO:DCA-P data.

PostScript data
> Data that is created by a page description language that describes how text and graphics are presented on printers and display devices.

Tagged Image File Format (TIFF) data
> Data that defines black-and-white, grayscale, and full-color images.

Note: To transmit PostScript data, TIFF data, and MO:DCA-P data with inline resources, the administrator must change the supplied shell script for InfoPrint Manager for AIX or the destination control file for InfoPrint Manager for Windows. See "Identifying the data type for printing" on page 54 for more information.

Using job control language

In most cases, you can use the same JCL parameters as you do currently, with little or no modification. This section describes considerations in these areas that might require JCL modification:
- "Directing output to a remote system and server" on page 48
- "Directing output to more than one system or server" on page 48
- "Specifying a checkpointing interval" on page 48
- "Specifying archiving options to OnDemand" on page 48
- "Specifying printing parameters to the remote print server" on page 49
- "Using AFP resources for printing" on page 52

Directing output to a remote system and server

To transmit your output to a remote system, you must direct the output to the Download for z/OS FSA. To do this, you specify the JES work-selection criteria that are defined by your installation for the Download for z/OS FSA on either the DD or OUTPUT JCL statements for the data set. For example, you might need to specify a particular output class to direct output to the Download for z/OS FSA in your installation. Consult your system programmer for the appropriate values to specify.

To direct an output data set to a particular remote server, you specify the appropriate routing criteria as defined by your installation in the routing-control data set. The routing criteria can include one or more of these JCL parameters:
- Output class
- Destination name
- Form name

You specify these routing criteria on either the DD or OUTPUT JCL statements for the data set. Consult your system programmer to determine the values to specify.

Each combination of class, destination, and form name that you specify can direct the data set to a different remote system and to a different server on that system. See "Directing output to a remote system and server" on page 70 for an example of how to use class, form, or destination to direct output to a remote system.

Directing output to more than one system or server

To transmit an output data set to more than one remote server, you can create multiple output data sets. You do this by using multiple OUTPUT JCL statements. On each OUTPUT statement, specify the class, form, or destination name that corresponds to the remote server to which you want that data set transmitted.

See "Directing output to multiple systems or servers" on page 71 for an example of how to transmit a data set to more than one system or server at the same time.

Specifying a checkpointing interval

You can request that Download for z/OS perform checkpointing of the data set while the data set is transmitted to the remote system. If checkpointing is requested, Download for z/OS can restart transmission from the checkpoint if an error occurs.

Because Download for z/OS does not format data into pages, you must specify a checkpointing interval in seconds, not in pages. Specify the CKPTSEC parameter instead of the CKPTPAGE parameter on the OUTPUT JCL statement. Your installation might have defined a default checkpointing interval to be used when you do not request checkpointing.

Specifying archiving options to OnDemand

Download for z/OS transmits values that you specify in JCL parameters to the OnDemand servers. Download for z/OS transmits the same parameters to the all remote servers, even though most of the parameters are printing options. This lets you pass a parameter that is required by OnDemand, such as an application group name, with each transmitted data set. For example, your installation might use the

FORMS parameter to transmit a parameter to OnDemand. Consult your OnDemand system administrator for more information.

Specifying printing parameters to the remote print server

Along with the output data set, Download for z/OS transmits information to the remote print server about how to format the data set for printing. This information includes parameters such as CHARS, COPIES, FCB, FORMDEF, and PAGEDEF. The parameter values that Download for z/OS transmits might come from JES device defaults, PRINTDEV defaults, or user JCL parameters. In JES3, many JCL parameters, such as CHARS, FCB, and FORMS, do not override the JES defaults unless the parameter is included as a writer-selection criteria for the device (see the JES3 WS parameter in "DEVICE statement" on page 19).

The system programmer can specify more information for Download for z/OS to transmit to the server. See "Writing an installation exit" on page 37 for more information.

The printing parameters that are transmitted to an AIX or Linux server can be used by one or more of the print commands in an AIX or Linux operating system. In InfoPrint Manager for AIX, the system administrator determines, in the shell script that is used by the server, which command is to print the data set: **pdpr**, **enq**, **lp**, or **qprt**. The sample shell script that is provided with InfoPrint Manager for AIX runs the **pdpr** command to print the data. In Ricoh ProcessDirector, the user configures the JCL parameters to map to Ricoh ProcessDirector job properties in a control file. The control file is named in the job type that is used to process jobs received from Download for z/OS.

For InfoPrint Manager for Windows, the printing parameters that are transmitted to the InfoPrint Manager for Windows server are converted to another set of InfoPrint Manager for Windows parameters by the destination control file. The converted parameters are passed to an exit routine that runs the **pdpr** command to print the data. A sample destination control file and a sample exit routine are provided with InfoPrint Manager for Windows.

JCL parameters and corresponding system parameters

Table 11 lists JCL parameters that Download for z/OS processes, the corresponding print options that Download for z/OS passes to the remote system and corresponding AIX, Linux, and Windows printing parameters. Download for z/OS replaces nulls (X'00') and blanks (X'40') in the values of text parameters with X'1C' to make it possible for AIX and Linux to parse the text string. Examples of text parameters are TITLE, ADDRESS, NAME, BUILDING, DEPT, and ROOM. Download for z/OS does not transmit all JCL parameters; it transmits only those parameters that are supported by the remote print server. See "Printing parameters not transmitted" on page 51 for a list of some JCL parameters that Download for z/OS does not pass to the remote server.

Table 11. JCL parameters and corresponding AIX, Linux, and Windows printing parameters. N/A indicates that the command does not have a corresponding attribute or flag.

JCL Parameter	Option Passed to Script or Exit Routine	pdpr Attribute	enq, lp, qprt Flag
ADDRESS	-oaddress1 -oaddress2 -oaddress3 -oaddress4	address1-text address2-text address3-text address4-text	-oaddress1 -oaddress2 -oaddress3 -oaddress4

Table 11. JCL parameters and corresponding AIX, Linux, and Windows printing parameters (continued). N/A indicates that the command does not have a corresponding attribute or flag.

JCL Parameter	Option Passed to Script or Exit Routine	pdpr Attribute	enq, lp, qprt Flag
BUILDING	-obu	building-text	-obuilding
CHARS	-ochars	chars	-ochars
CKPTSEC	Not transmitted to the AIX, Linux, or Windows operating system.		
CLASS	-opa class	printer-pass-through=-opa=class	-opassthru class
COLORMAP	-ocolormap	N/A	N/A
COMSETUP	-ocomsetup	N/A	N/A
COPIES	-ocop	copy-count	-ocopies
DATACK	-odatac	data-fidelity-problem-reported	-odatack
DCB=RECFM	-occ -occtype	carriage-control-type	-occ -occtype
DCB=OPTCD=J	-otrc	table-reference-characters	-otrc
DEPT	-ode	department-text	-odepartment
DEST	-opa destination	printer-pass-through=-opa=destination (Windows: also maps to target-destination-name)	-opassthru dest
DEST=IP	-oipdest	Windows: printer-pass-through=-opa=ipaddr	N/A
DUPLEX	-odu	sides and plex	N/A
FCB	-opagedef	page-definition	-opagedef
FORMDEF	-of	form-definition	-oformdef
FORMLEN	-oformlength	form-length	N/A
FORMS	x-opa forms	printer-pass-through=-opa=forms	-opassthru forms
INTRAY	-oin	printer-pass-through=-obin	N/A
NAME	-ona	name-text	-oname
NOTIFY	Not transmitted to the remote system.		
OFFSETXB	-ooffxb	x-image-shift-back	N/A
OFFSETXF	-ooffxf	x-image-shift	N/A
OFFSETYB	-ooffyb	y-image-shift-back	N/A
OFFSETYF	-ooffyf	y-image-shift	N/A
OVERLAYB	-oovlyb	overlay-back	N/A
OVERLAYF	-oovlyf	overlay-front	N/A
OUTBIN	-ooutbin	output-bin	-ooutbin
PAGEDEF	x-opagedef	page-definition	-opagedef
PRMODE	-oprmode	shift-out-shift-in	-oprmode
PRTQUEUE	-oprtqueue	N/A	N/A
RESFMT	-ore	font-resolution	N/A
ROOM	-oro	room-text	-oro

Table 11. JCL parameters and corresponding AIX, Linux, and Windows printing parameters (continued). N/A
indicates that the command does not have a corresponding attribute or flag.

JCL Parameter	Option Passed to Script or Exit Routine	pdpr Attribute	enq, lp, qprt Flag
SEGMENT	-opa segmentid	printer-pass-through=-opa=segmentid	-opassthru segmentid
	Note: The SEGMENT value is not transmitted to the remote system. However, a segment identifier is transmitted.		
SYSOUT	-opa class -opa forms	printer-pass-through=-oclass printer-pass-through=-oforms	-opassthru class -opassthru forms
TITLE	-oti	title-text	-otitle
TRC	-otrc	table-reference-characters	-otrc
UCS	-ochars	chars	-ochars

Printing parameters not transmitted

Download for z/OS ignores DD and OUTPUT statement parameters other than
those described in Table 11 on page 49. The following list describes some JCL
parameters that Download for z/OS ignores:

- ACCT, which you can use to specify accounting information.

  Download for z/OS does not have access to the value specified in this EXEC
  statement parameter.

- BURST, which you can use to request bursting on a continuous-forms printer.

  Print commands on an AIX, Linux, or Windows operating system do not have a
  comparable option.

- COPIES Group Values, which you can use to print multiple copies of selected
  pages.

  Print commands on an AIX, Linux, or Windows operating system do not have a
  comparable option. Instead, specify copy group values in a form definition.

- FLASH, which you can use to request a specific forms flash on a 3800 printer.

  InfoPrint Manager and Ricoh ProcessDirector do not support the 3800 printer.

- PIMSG, which you can use to request suppression of error messages and request
  termination of processing after a certain number of error messages.

  On the AIX, Linux, or Windows operating system, all error messages print by
  default.

- USERLIB, which lets you use resources that are in a PSF for z/OS user library.

  Either include these resources inline, or request that the system administrator
  make these resources available for printing on the remote system.

Job information and corresponding system parameters

Download for z/OS also transmits job information to the remote system. Table 12
on page 52 lists the job information, the corresponding print options that
Download for z/OS passes to the remote system, and the corresponding AIX,
Linux, or Windows printing parameters.

Table 12. Job information and corresponding AIX, Linux, and Windows printing parameters

Job Information	Option Passed to Script or Exit Routine	pdpr Attribute	enq, lp, qprt Flag
Job ID (JES job ID taken from JSPAJBID)	-opa jobid	printer-pass-through=-opa=jobid	-opassthru jobid
Job Name (JES job name taken for JSPAJBNM)	-ojobn	job-name (Windows: also maps to job-owner)	-ojobname
Node ID	-ono	node-id-text	-onodeid
Programmer Name	-opr	programmer-text	-oprogrammer
User ID	-ous	user-id-text	-ouserid

Data format and type information and corresponding system parameters

Table 13 lists the data format and data type that Download for z/OS transmits to the remote system and the corresponding AIX, Linux, or Windows parameters. Download for z/OS transmits the same data format and data type values for each data set to the server, regardless of the type of data in the data set. In InfoPrint Manager, when you transmit data such as PostScript, TIFF, or MO:DCA-P data with inline resources, your administrator needs to change the supplied shell script on the AIX server or the destination control file on the Windows server. See "Identifying the data type for printing" on page 54 for more information.

Table 13. File information and corresponding AIX, Linux, and Windows printing parameters

File Information	Option Passed to Script or Exit Routine	pdpr Attribute	enq, lp, qprt Flag
Data Format	-ofileformat	new-line-option	-ofileformat
Data Type	-odatat=line	document-format	-odatatype

Using AFP resources for printing

For printing with InfoPrint Manager or Ricoh ProcessDirector, you can either use default AFP resources or name specific resources in JCL parameters, as you can do when printing with PSF on a local or remote z/OS system. If you use resources other than the default resources, consider these differences:

- The required AFP resources, such as page definitions, form definitions, and fonts, must be accessible to the AIX, Linux, or Windows operating system, or the resources can be transmitted with a MO:DCA-P data set. The system administrator can make AFP resources on the z/OS operating system accessible to the AIX, Linux, or Windows operating system with the Network File System (NFS) mount command; see your system administrator for more information. To transmit MO:DCA-P data with inline resources, see "Identifying the data type for printing" on page 54 for more information.
- If you specify a form definition or page definition name of DUMMY in the FORMDEF or PAGEDEF parameter, the output data set must contain an inline form definition or page definition, but it *cannot* contain line data or mixed-mode data. If you specify DUMMY when no inline form definition or page definition exists, the print server tries to find a form or page definition that is named DUMMY in the AIX, Linux, or Windows resource directories.

When you print with PSF for z/OS and specify a name of DUMMY, PSF for z/OS uses the default form or page definition if no form definition or page definition is sent inline.

- If you specify a font in the UCS or CHARS parameter, and the page definition used to format the data set also specifies a font, the print server uses the font in the page definition, whether that page definition is the system default page definition or not.

  When you print with PSF for z/OS, PSF uses the font that you specify in the UCS or CHARS parameter if the page definition used to format the data set is the system default page definition.

- The file names of page definitions, form definitions, and fonts are case-sensitive on the AIX and Linux operating systems. Because values specified in JCL parameters are in uppercase characters, ensure that the file names on the AIX or Linux system are also in uppercase. This is not a concern on Windows systems because the file names of AFP resources are not case-sensitive.

InfoPrint Manager and Ricoh ProcessDirector *cannot* print data sets that contain line data or mixed-mode data along with inline resources unless RESTYPE=INLINE,ALL is specified; otherwise, the inline resources are lost and not used to print the data set. In InfoPrint Manager, RESTYPE=INLINE,ALL is specified in the shell script or destination control file. Another option is to use one of these procedures before transmitting such data sets to InfoPrint Manager for AIX or InfoPrint Manager for Windows:

- Use the ACIF program on the z/OS host, and modify the shell script or modify the destination control file:

  1. On the z/OS operating system, use the AFP Conversion and Indexing Facility (ACIF) to convert the data stream to MO:DCA-P data streams. Specify the RESTYPE=ALL parameter and a RESOBJDD card in the JCL to create an AFP-only print file and an inline resource file. Concatenate the inline resource file to the beginning of the print file. For more information about ACIF, see *PSF for z/OS: AFP Conversion and Indexing Facility User's Guide*. Use Download for z/OS to transmit the output from the ACIF program to the server on the AIX or Windows operating system.

  2. Do one of these:
     - In the shell script that is supplied with InfoPrint Manager for AIX, code the **document-format=afpds** attribute and run the **pdpr** command.
     - In the destination control file that is supplied with InfoPrint Manager for Windows, change the mapping of **DATATYPE** to **document-format=afpds**.

- Modify the shell script or modify the exit routine and destination control file:

  1. Use the **line2afp** program to break the line or mixed mode file into a resource file and an AFP-only file.

  2. Concatenate the resource file to the beginning of the print file.

  3. Do one of these:
     - In the shell script that is supplied with InfoPrint Manager for AIX, remove all parameters that are line parameters: **pagedef**, **cc**, **fileformat**, **chars**, **resource-context**; code the **document-format=afpds** attribute; and run the **pdpr** command.
     - In the destination control file that is supplied with InfoPrint Manager for Windows, change the mapping of **DATATYPE** to **document-format=afpds**. Also set up the destination control file to discard all received line parameters. These line parameters include: **pagedef**, **cc**, **fileformat**, and **chars**.

To convert line data in Ricoh ProcessDirector, make sure that the job is processed by a job type that converts line data to AFP.

If you use default AFP resources, see "Determining defaults for printing."

Identifying the data type for printing

Download for z/OS always passes a data type of line to the script in the **-odatat=line** parameter, regardless of the actual data type. The supplied script or destination control file sets this value in the **document-format** attribute of the **pdpr** command. This data type is correct for MO:DCA-P data without inline resources, line data, and mixed mode data sets.

When transmitting the following types of data, however, the correct data type must be specified on the **pdpr** command:
- MO:DCA-P data with inline resources
- Special data types such as PostScript and TIFF data

In InfoPrint Manager, the administrator must modify either the shell script on the AIX server or the destination control file, exit routine, or both on the Windows server to set the correct data type on the **pdpr** command. Consider using this procedure in your installation:

1. Select a JCL parameter that Download for z/OS transmits to the server, but which is not used by job submitters for any other purpose; for example, you might select the ADDRESS4 JCL parameter. The job submitter specifies the data type in this parameter; for MO:DCA-P data, the job submitter would specify **afpds**.

2. For AIX, change the supplied shell script to set the value of the **document-format** attribute to the value in the selected JCL parameter, for example, ADDRESS4. For Windows, change the mapping in the destination control file of the selected JCL parameter to **datatype**.

To set the correct data type in Ricoh ProcessDirector, make sure that the job type you specify to process the job contains a step that is based on the DetectInputDataStream step template.

Determining defaults for printing

When you use Download for z/OS to print on an AIX, Linux, or Windows operating system, defaults for AFP resources and printing options might be different from the defaults defined for printing with PSF for z/OS. The z/OS system programmer, and the AIX, Linux, or Windows system administrator, can define defaults for AFP resources and printing options.

The z/OS system programmer can also define a default page definition and font for the Download for z/OS FSA in JES initialization statements and in the Download for z/OS startup procedure. The system programmer can define a default form definition and data-check option in the Download for z/OS startup procedure. If the system programmer has not specified a default, the system administrator can specify a default for each InfoPrint Manager or Ricoh ProcessDirector server, or AIX or Linux print queue. Consult your z/OS system programmer and AIX, Linux, or Windows system administrator to determine what defaults have been defined.

JCL parameters

This section describes all of the JCL parameters that you might specify on the DD or OUTPUT JCL statements when you use Download for z/OS.

Note: Some of the JCL parameters that are described in this section specify printing options for PSF, InfoPrint Manager, or Ricoh ProcessDirector, and might have no significance if you are transmitting a data set to a OnDemand server.

Figure 16 summarizes the JCL parameters that you might consider using when transmitting a data set for printing.

```
ADDRESS=(address_lines)
BUILDING=building
CHARS=(font_names)
CKPTSEC=seconds
CLASS=class
COLORMAP=membername
COMSETUP=membername
COPIES=nnn
DATACK={BLOCK | UNBLOCK | BLKCHAR | BLKPOS }
DCB=OPTCD=J
DCB=RECFM={A | M}
DEPT=department
DEST=[node.]name
DEST='[node.]IP:ip_address'
DUPLEX={NO | NORMAL | TUMBLE}
FCB=pagedef_name
FORMDEF=formdef_name
FORMLEN=nn[.mmm]unit
FORMS=form_name
INTRAY=nnn
NAME=name
NOTIFY=([node.]userid)
OFFSETXB=nnnn[.mmm]unit
OFFSETXF=nnnn[.mmm]unit
OFFSETYB=nnnn[.mmm]unit
OFFSETYF=nnnn[.mmm]unit
OUTBIN=bin_number
OVERLAYB=overlay_name
OVERLAYF=overlay_name
PAGEDEF=pagadef_name
PRMODE={SOSI1 | SOSI2 | SOSI3 | aaaaaaaa}
PRTQUEUE='print_queue_name'
RESFMT={P240 | P300}
ROOM=room
SEGMENT=page_count
SYSOUT=(class,,form_name)
TITLE=title
TRC={YES | NO}
UCS=font_name
```

Figure 16. JCL parameters that Download for z/OS sends to a remote print server

Figure 17 on page 56 summarizes the JCL parameters that you might consider using when transmitting a data set for archiving with OnDemand for AIX.

```
CKPTSEC=seconds
CLASS=class
DEST=[node.]name
FORMS=form_name
NOTIFY=(node.userid)
SEGMENT=page_count
SYSOUT=(class,,form_name)
```

Figure 17. JCL parameters for OnDemand

Download for z/OS transmits all of the parameters that are shown in Figure 16 to each server on the remote system, except for the CKPTSEC, NOTIFY, and SEGMENT parameters.

You specify the JCL parameters that are described in this section on one or both of these JCL statements:
- DD statement
- OUTPUT statement

The examples included with each parameter description show which JCL statements you can specify the parameter on. If you specify the same parameter on both the DD and the OUTPUT JCL statements, the parameter on the DD statement is used.

For more details about how to code the parameter values, see the *JCL Reference* for your operating system.

Note: The AIX, Linux, or Windows system administrator can configure print jobs so that they are routed by different methods to their target destinations. Contact your system administrator to determine the method that is required to route a print job to a specific target destination.

ADDRESS=(address_lines**)**
Specifies up to four lines of address information to be sent to the remote server. Each line of address information can contain 1 - 60 characters, separated with commas.

Default: None.

Example:
```
//OUTDS  OUTPUT ADDRESS=('J. Plant','123 Main St.','BOULDER, CO','80301')
```

BUILDING=building
Specifies 1 - 60 characters of building information to be sent to the remote server.

Default: None.

Example:
```
//OUTDS  OUTPUT BUILDING='920'
```

CHARS=(font_names**)**
Specifies 1 - 4 coded font names that the remote print server uses to print a data set containing line data. Do not include the 2-character prefix of the coded-font name (X0 through XG).

- For a remote PSF server, the fonts that you specify must be in a library that is assigned to the printer you are using or in a user library that is specified with the JCL USERLIB parameter, or else they must be inline with the print data set.
- For InfoPrint Manager and Ricoh ProcessDirector, the fonts that you specify must be in an AIX, Linux, or Windows directory that is specified as part of the InfoPrint Manager or Ricoh ProcessDirector search path, or be resident in the printer. Because InfoPrint Manager *cannot* print data sets that contain line data or mixed-mode data with inline fonts, consider using the AFP Conversion and Indexing Facility (ACIF) on the z/OS operating system or the **line2afp** command in the AIX shell script or Windows Download for z/OS exit routine to convert such a data set to a MO:DCA-P data stream. See "Using AFP resources for printing" on page 52 for more information.

You can specify a font name in either the CHARS parameter or the UCS parameter. If you specify a font in both parameters, the font on the CHARS parameter is used. If the page definition used to print a data set specifies a font:

- A remote PSF server uses fonts in this order:
  1. The font that is specified in a page definition that is specified with the PAGEDEF or FCB parameter, including the JES default FCB for the printer
  2. The font that is specified in the CHARS parameter
  3. The font that is specified in a default page definition that is specified in the PSF startup procedure
- InfoPrint Manager and Ricoh ProcessDirector use the font that is specified in the page definition and ignores the font that is specified in the CHARS parameter.

Default: If no fonts are specified in the page definition, and if you do not specify either the CHARS or the UCS parameters, the default is the font set during Download for z/OS configuration. If no default was set, the remote print server uses the default font that is defined for the printer.

Examples: You can specify the CHARS parameter on the DD and OUTPUT statements, as shown.

```
//DD1   DD CHARS=(60D8)
//OUTDS  OUTPUT CHARS=(60D8)
```

CKPTSEC=_seconds_
Specifies the number of seconds to be taken between checkpoints of the data set as it is being transmitted to the remote system; specify a number from 1 - 32767, inclusive.

Note: Do not specify the CKPTPAGE parameter because Download for z/OS does not support checkpointing by page. If you specify both CKPTPAGE and CKPTSEC:
- JES2 ignores the CKPTSEC parameter, unless your installation specified during JES2 initialization that checkpoints are to be based only on time.
- JES3 ignores the CKPTSEC parameter.

Consider these performance impacts when choosing an interval:

- If the interval number is too low, resulting in many checkpoints, performance might be reduced because of the checkpointing processing required.
- If the number of seconds between intervals is too high, errors that require retransmittal of large amounts of data might reduce performance.

Default: Download for z/OS uses the default checkpoint interval that is specified during Download for z/OS configuration. If no default is specified, no checkpoints are taken.

Example:

```
//OUTDS  OUTPUT CKPTSEC=30
```

CLASS=_class_

Specifies the class of the data set to be sent to the remote server.

Download for z/OS might use the class that you specify, along with the destination and form names, to route the data set to a particular remote server.

You can specify an output class on two JCL statements:
- The SYSOUT parameter on the DD statement.
- The CLASS parameter on an OUTPUT statement that is assigned to that DD statement. To specify a class on the OUTPUT statement, you must enter a null class in the DD SYSOUT parameter: SYSOUT=(,).

Note: Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to a remote system and server.

Default: If you do not specify a class value in either the OUTPUT or the DD statement, the default class is A.

Example:

```
//OUTDS  OUTPUT CLASS=C
//DD1    DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

COLORMAP=_membername_

Specifies the object container member name of the color mapping table resource at the receiver destination.

Example: You can specify the COLORMAP parameter on the OUTPUT statement, as shown:

```
//OUTDS  OUTPUT COLORMAP=MYCOLORM
```

COMSETUP=_membername_

Specifies the object container member name of the microfilm setup resource at the receiver destination.

Example: You can specify the COMSETUP parameter on the OUTPUT statement, as shown:

```
//OUTDS  OUTPUT COMSETUP=MYCOMSET
```

COPIES=_nnn_

Specifies the copies value, from 1 - 255, to be sent to the remote server.

Download for z/OS ignores any group values that you specify on this parameter; instead, specify group values in a form definition.

Default: One copy.

Examples: You can specify the COPIES parameter on the DD and OUTPUT statements, as shown.

```
//DD1   DD COPIES=14
//OUTDS  OUTPUT COPIES=14
```

DATACK={BLOCK | UNBLOCK | BLKCHAR | BLKPOS}
Specifies the data blocking value to be sent to the remote server.

BLOCK
Specifies that the printer is not to report print-positioning or character errors that are not valid.

UNBLOCK
Specifies that the printer is to report all data-check errors. If a print-positioning error occurs, the exception is highlighted on the printed page to help you locate where the attempt to print outside the valid printable area occurred.

BLKCHAR
Specifies that the printer is not to report character errors that are not valid. Print-positioning errors are reported normally.

BLKPOS
Specifies that the printer is not to report print-positioning errors. Character errors that are not valid are reported normally.

Default: A default can be specified during Download for z/OS configuration. If no default is specified, the default is BLOCK.

Example:

```
//OUTDS  OUTPUT DATACK=UNBLOCK
```

DCB=OPTCD=J
Specifies the DCB value to be sent to the remote server. This generally indicates that the print data set contains table reference characters (TRCs). You can also specify TRCs on the TRC parameter of the OUTPUT statement.

Default: If you omit the TRC parameter and this parameter, the default is TRC=NO.

Example:

```
//DD1   DD DCB=OPTCD=J
```

DCB=RECFM={A | M}
Specifies whether ANSI or machine carriage-control characters exist in a data set containing line data. If the data set contains AFP resources (such as page segments), specify that either ANSI or machine carriage controls exist.

Default: None.

Example:

```
//DD1   DD DCB=RECFM=A
```

DEPT=_department_
Specifies a 1- to 60-character department name to be sent to the remote server.

Default: None.

Example:
```
//OUTDS   OUTPUT DEPT='PAYROLL'
```

DEST=[*node.***]***name***
Specifies a destination name to be sent to the remote server. Specify a 1- to 8-character destination name or a node and destination name.

Download for z/OS might use the destination that you specify, along with the class and form names, to route the data set to a particular remote server. Contact your system programmer to determine the correct destination to specify, depending on how Download for z/OS and the server are configured.

Note: Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to a remote system and server.

If you specify the DEST parameter on the DD statement, you must also specify the SYSOUT parameter; otherwise, the system ignores the DEST parameter after checking it for syntax.

For InfoPrint Manager for Windows, the supplied destination control file also uses the destination name as the target-printer-destination for the data set. Contact your Windows system programmer to determine the correct destination to specify.

Examples: You can specify the DEST parameter on the DD and OUTPUT statements, as shown.
```
//DD1   DD SYSOUT=R,DEST=PSF6000
//OUTDS   OUTPUT DEST=PSF6000
```

DEST='[*node.***]IP:***ipaddr***'**
Specifies an IP address for the print data set. Specify 1 - 124 printable characters; the length of the entire parameter list must not exceed 127 characters and must be enclosed in single quotation marks.

This IP address does not affect the transmission of the data set to a remote system or server; Download for z/OS always uses the IP address that is specified in the routing-control data set to transmit a data set to a remote server. This field provides an additional value, which the shell script, destination control file, or exit routine on the remote server can optionally use to route a file to a particular printer attached to the remote server. In InfoPrint Manager, the administrator must modify the supplied shell script, destination control file, or exit routine to use this field.

Note: If you specify the DEST=IP parameter, you cannot also specify a destination name in the DEST JCL parameter. Therefore, if your system programmer configured the Download for z/OS FSA to select jobs that are based on destination name (that is, WS=R is specified as a JES work-selection criterion), or if your system programmer defined destination name as a routing criterion for the remote server in the routing-control data set, you must specify a destination name and cannot specify the DEST=IP parameter.

Example:
```
//OUTDS   OUTPUT DEST='IP:PRINTER629'
```

DUPLEX={NO | NORMAL | TUMBLE}
Specifies the duplex value to be sent to the remote server and indicates whether printing is to be done on one or both sides of each sheet.

NO Requests printing on the front side of each sheet.

NORMAL
> Requests printing on both sides of the sheet such that the sheets can be bound on the long edge of the paper.

TUMBLE
> Requests printing on both sides of the sheet such that the sheets can be bound on the short edge of the paper.

Default: If you omit this parameter, InfoPrint Manager or Ricoh ProcessDirector uses the value in the form definition.

Example:
```
//OUTDS  OUTPUT DUPLEX=NORMAL
```

FCB=_pagedef_name_
Specifies the 1- to 4-character name of the page definition to be sent to the remote server. Do not add the P1 prefix to the name of the page definition because Download for z/OS adds the system prefix P1 to the name.

Because the FCB parameter allows a maximum of only 4 characters, the PAGEDEF parameter is preferred. See the description of the PAGEDEF parameter for more information.

FORMDEF=_formdef_name_
Specifies the name of the form definition to be sent to the remote server. Specify a 1- to 6-character name. Do not add the F1 prefix to the name because Download for z/OS adds F1 to the name that is specified in this parameter.

For InfoPrint Manager or Ricoh ProcessDirector:
- If the data set contains a MO:DCA-P data stream, the form definition that you specify must be in a directory that is specified in the InfoPrint Manager or Ricoh ProcessDirector search path or can be included inline.
- If the data set contains line data or mixed-mode data, the form definition that you specify must be in a directory that is specified in the InfoPrint Manager or Ricoh ProcessDirector search path. Because InfoPrint Manager _cannot_ print data sets that contain line data or mixed-mode data with an inline form definition, consider using the AFP Conversion and Indexing Facility (ACIF) on the z/OS system or the **line2afp** command in the AIX shell script or Windows exit routine to convert such a data set to a MO:DCA-P data stream. See "Using AFP resources for printing" on page 52 for more information.

To use an inline form definition:
- For InfoPrint Manager, specify the name of the inline form definition or specify DUMMY as the name.
- For Ricoh ProcessDirector, make sure that the job type you specify to process the job contains a step that is based on the UseInlineFormDefiniiton step template.

Note: For InfoPrint Manager, or the **line2afp**, specify DUMMY only if the data set does not contain line data or mixed-mode data. If you specify DUMMY, InfoPrint Manager and the **line2afp** command use the first inline form definition found; however, if no inline form definition is found, InfoPrint Manager and the **line2afp** command look for a form

definition that is named DUMMY in the AIX or Windows resource directories. Also, see "Identifying the data type for printing" on page 54 for more information.

Default: The default is the form definition name that is specified during Download for z/OS configuration. If no default is specified, InfoPrint Manager and Ricoh ProcessDirector use the default that is established by the AIX, Linux, or Windows system administrator.

Example: This example specifies F1USER10 as the form definition.
```
//OUTDS   OUTPUT FORMDEF=USER10
```

FORMLEN=_nn_**[.**_mmm_**]**_unit_
Specifies the length of the form (paper) to be sent to the remote server. Together with FORMDEF, this parameter allows the length of the form that is specified in JCL to override the value that is configured at Intelligent Printer Data Stream (IPDS) printers that support Set Media Size. Generally, FORMS is also used to have the operator load the correct paper.

_nn_   Specifies a one- or two-digit number, which can be zero. This value is required.

.mmm   Specifies a decimal point (period) followed by one to three digits. This value is optional.

unit   Specifies the unit of measure:

> **IN**   Specifies a unit of inches
>
> **CM**   Specifies a unit of centimeters

> _unit_ is required. Download for z/OS converts all values to millimeters, which is the unit of measure that InfoPrint Manager requires.

Default: If you do not specify this value, then the printer's default paper length is used.

Example: This example sets a paper length of 9.5 inches in the output statement:
```
//OUTPUT1   OUTPUT FORMLEN=9.5IN
//DD1       DD     SYSOUT=class,OUTPUT=(*.OUTPUT1)
```

FORMS=_form_name_
Specifies the 1- to 8-character form name to be sent to the remote server. InfoPrint Manager can print the form name on the header, trailer, or separator pages, if the correct user exit is activated.

The form name that you specify does not result in any forms setup messages on the remote server.

Download for z/OS might use the form name that you specify, along with the class and destination values, to route the data set to a particular remote server. Contact your system programmer to determine the correct form name to specify, depending on how Download for z/OS is configured.

Notes:

1. Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to a remote system and server.

2. JES3 does not pass the form name to the Download for z/OS FSA unless
   you specify the form name as a work-selection criteria. Therefore, in the
   JES3 environment, to pass FORM to InfoPrint Manager, Ricoh
   ProcessDirector, or OnDemand, specify form name as a work-selection
   criteria and specify form name as a selection criteria in the routing-control
   data set.

Default: If you do not specify a form name on either the OUTPUT or the DD
statement, JES uses an installation default.

Example:

```
//OUTDS   OUTPUT FORMS=BILLS
```

INTRAY=*nnn*

Specifies an input tray number from 1 - 255 to be sent to the remote server.
The input tray number identifies the tray from which paper is to be selected.
To determine the input tray identifiers for your printer, see your printer
documentation.

Default: If you omit this parameter, a remote print server uses the value in the
form definition.

Example: This example specifies that paper is to be taken from the side tray of
an IBM 3160 printer with the optional side tray installed. The
optional side tray of a 3160 printer is identified as tray 4.

```
//OUTDS   OUTPUT INTRAY=4
```

NAME=*name*

Specifies a 1- to 60-character name to be sent to the remote server.

Default: None.

Example:

```
//OUTDS   OUTPUT NAME='R. ROPER'
```

NOTIFY=([*node.***]***userid* **...)**

Specifies up to four user IDs that Download for z/OS is to notify when the
data set has been successfully or unsuccessfully transmitted to the remote
system; separate the user IDs with commas.

Download for z/OS notifies the user IDs when the transmission is successful,
the data set is held by the system because of an error, or the operator cancels
the data set. The notification message is also sent to the SYSLOG data set.

Default: None.

Example:

```
//OUTDS   OUTPUT NOTIFY=(SEATTLE.JOE,SEATTLE.MARY)
```

OFFSETXB=*nnnn*[**.***mmm*]*unit*

Specifies the OFFSETXB value to be sent to the remote server. OFFSETXB is the
offset in the x direction of the logical page origin from the media origin for the
back side of each sheet.

nnnn   Specifies a one- to four-digit number, which can be zero. This value is
required.

.mmm   Specifies a decimal point (period) followed by one to three digits. This
value is optional.

<dl>

 unit Specifies the unit of measure:

   IN   Specifies a unit of inches

   CM   Specifies a unit of centimeters

   MM   Specifies a unit of millimeters

   PELS   Specifies a unit of picture elements (1/240 inch)

   POINTS   Specifies a unit of points (1/72 inch)

</dl>

 unit is required. Download for z/OS converts all values to millimeters, which is the unit of measure that InfoPrint Manager requires.

Default: A remote print server uses the value in the form definition.

Example: This example sets the page origin to 0.5 inches, 1.1 inches on the front side and 1.5 inches, 1.1 inches on the back side.

```
//OUTDS   OUTPUT OFFSETXF=0.5IN,OFFSETYF=1.1IN,OFFSETXB=1.5IN,OFFSETYB=1.1IN
```

OFFSETXF=*nnnn*[**.***mmm*]*unit*

Specifies the OFFSETXF value to be sent to the remote server. OFFSETXF is the offset in the x direction of the logical page origin from the media origin for the front side of each sheet.

 nnnn Specifies a one- to four-digit number, which can be zero. This value is required.

 .mmm Specifies a decimal point (period) followed by one to three digits. This value is optional.

 unit Specifies the unit of measure:

   IN   Specifies a unit of inches

   CM   Specifies a unit of centimeters

   MM   Specifies a unit of millimeters

   PELS   Specifies a unit of picture elements (1/240 inch)

   POINTS   Specifies a unit of points (1/72 inch)

 unit is required. Download for z/OS converts all values to millimeters, which is the unit of measure that InfoPrint Manager requires.

Default: A remote print server uses the value in the form definition.

Example: This example sets the page origin to 0.5 inches, 1.1 inches on the front side and 1.5 inches, 1.1 inches on the back side.

```
//OUTDS   OUTPUT OFFSETXF=0.5IN,OFFSETYF=1.1IN,OFFSETXB=1.5IN,OFFSETYB=1.1IN
```

OFFSETYB=*nnnn*[**.***mmm*]*unit*

Specifies the OFFSETYB value to be sent to the remote server. OFFSETYB is the offset in the y direction of the logical page origin from the media origin for the back side of each sheet.

 nnnn Specifies a one- to four-digit number, which can be zero. This value is required.

 .mmm Specifies a decimal point (period) followed by one to three digits. This value is optional.

 unit Specifies the unit of measure:

IN	Specifies a unit of inches
CM	Specifies a unit of centimeters
MM	Specifies a unit of millimeters
PELS	Specifies a unit of picture elements (1/240 inch)
POINTS	Specifies a unit of points (1/72 inch)

unit is required. Download for z/OS converts all values to millimeters, which is the unit of measure that InfoPrint Manager requires.

Default: A remote print server uses the value in the form definition.

Example: This example sets the page origin to 0.5 inches, 1.1 inches on the front side and 1.5 inches, 1.1 inches on the back side.

```
//OUTDS  OUTPUT OFFSETXF=0.5IN,OFFSETYF=1.1IN,OFFSETXB=1.5IN,OFFSETYB=1.1IN
```

OFFSETYF=*nnnn***[.***mmm***]***unit*
Specifies the OFFSETYF value to be sent to the remote server. OFFSETYF is the offset in the y direction of the logical page origin from the media origin for the front side of each sheet.

nnnn Specifies a one- to four-digit number, which can be zero. This value is required.

.mmm Specifies a decimal point (period) followed by one to three digits. This value is optional.

unit Specifies the unit of measure:

IN	Specifies a unit of inches
CM	Specifies a unit of centimeters
MM	Specifies a unit of millimeters
PELS	Specifies a unit of picture elements (1/240 inch)
POINTS	Specifies a unit of points (1/72 inch)

unit is required. Download for z/OS converts all values to millimeters, which is the unit of measure that InfoPrint Manager requires.

Default: A remote print server uses the value in the form definition.

Example: This example sets the page origin to 0.5 inches, 1.1 inches on the front side and 1.5 inches, 1.1 inches on the back side.

```
//OUTDS  OUTPUT OFFSETXF=0.5IN,OFFSETYF=1.1IN,OFFSETXB=1.5IN,OFFSETYB=1.1IN
```

OUTBIN=*bin_number*
Specifies the value of the output bin to be sent to the remote server.

Default: The default is either the value in the form definition or the value that is established by the system administrator for the remote server.

Example:

```
//OUTDS  OUTPUT OUTBIN=2
```

OVERLAYB=*overlay_name*
Specifies the name of a medium overlay to be sent to the remote server. This

overlay is typically placed on the back side of each page. The complete name of the overlay must be given; Download for z/OS does not add an O1 prefix.

OVERLAYF=*overlay_name*

Specifies the name of a medium overlay to be sent to the remote server. This overlay is typically placed on the front side of each page. The complete name of the overlay must be given; Download for z/OS does not add an O1 prefix.

PAGEDEF=*pagedef_name*

Specifies the name of the page definition to be sent to the remote server that formats a data set containing line data; specify a 1- to 6-character name. Do not specify the P1 prefix to the name because Download for z/OS adds P1 to the name that is specified in this parameter.

For InfoPrint Manager and Ricoh ProcessDirector:

- If the data set contains a MO:DCA-P data stream, the page definition that you specify must be in a directory that is specified in the InfoPrint Manager or Ricoh ProcessDirector search path or can be included inline.

- If the data set contains line data or mixed-mode data, the page definition that you specify must be in a directory that is specified in the InfoPrint Manager or Ricoh ProcessDirector search path. Because InfoPrint Manager *cannot* print data sets that contain line data or mixed-mode data with an inline page definition, consider using the AFP Conversion and Indexing Facility (ACIF) on the z/OS system or the **line2afp** command in the AIX shell script or Windows exit routine to convert such a data set to a MO:DCA-P data stream. See "Using AFP resources for printing" on page 52 for more information.

To use an inline page definition for InfoPrint Manager, specify the name of the inline page definition or specify DUMMY as the name.

Note: For InfoPrint Manager or the **line2afp**, specify DUMMY only if the data set does not contain line data or mixed-mode data. If you specify DUMMY, InfoPrint Manager and the **line2afp** command use the first inline page definition found; however, if no inline page definition is found, InfoPrint Manager and the **line2afp** command look for a page definition that is named DUMMY in the AIX or Windows resource directories.

You can also specify a page definition in the FCB parameter. If you specify a page definition in both the PAGEDEF and FCB parameters, the page definition that is specified in the PAGEDEF parameter is used.

Default: If you omit the FCB parameter and the PAGEDEF parameter, the default is the page definition name that is specified during Download for z/OS configuration. If no default is specified, InfoPrint Manager and Ricoh ProcessDirector use the default that is established by the AIX, Linux, or Windows system administrator.

Example: This example specifies P1USER10 as the page definition.

```
//OUTDS   OUTPUT PAGEDEF=USER10
```

PRMODE={SOSI1 | SOSI2 | SOSI3 | *aaaaaaaa***}**

Specifies the processing mode value to be sent to the remote server. PRMODE indicates the processing mode of the data set and whether optional processing of the data must be performed.

SOSI1

Specifies that each shift-out, shift-in code is converted to a blank and a Set Coded Font Local text control.

SOSI2

Specifies that each shift-out, shift-in code is converted to a Set Coded Font Local text control.

SOSI3

Specifies that each shift-in code is converted to a Set Coded Font Local text control and two blanks. A shift-out code is converted to a Set Coded Font Local text control.

aaaaaaaa

Specifies any string that is defined in the JES initialization parameters for Download for z/OS. **LINE** and **PAGE** are examples of PRMODE values that JES uses for job routing information.

Note: Download for z/OS transmits only the SOSI1, SOSI2, and SOSI3 values to the remote system.

Default: JES assigns a value of LINE or PAGE.

Example:

```
//OUTDD   OUTPUT PRMODE=SOSI1
```

PRTQUEUE='*print_queue_name***'**

Specifies the name of a print queue to be sent to the remote server. A print queue is used for printing the data set. Specify any printable character string from 1 - 127 characters, and enclose the string in single quotation marks. You do not need to specify the DEST=IP parameter with the PRTQUEUE parameter.

Default: None.

Examples: The first example shows the PRTQUEUE parameter with the DEST=IP parameter. The second example shows the PRTQUEUE parameter without the DEST=IP parameter.

```
//OUTDS   OUTPUT DEST='PSF6000.IP:ATLANTA',PRTQUEUE='PRINTER619'
//OUTDS   OUTPUT PRTQUEUE='PRINTER619'
```

RESFMT={P240 | P300}

Specifies the resolution at which the output was formatted. A remote PSF server uses this value to choose the correct resolution system library. InfoPrint Manager can use this value to print the data set on a printer that supports the specified font resolution.

Default: None. If you omit this parameter and if no font resolution is specified in the data stream, then PSF uses the default resolution system library. InfoPrint Manager and Ricoh ProcessDirector use the default font resolution that is defined by the printer.

Example:

```
//OUTDS   OUTPUT RESFMT=P240
```

ROOM=*room*

Specifies a 1- to 60-character room name to be sent to the remote server.

Default: None.

Example:

```
//OUTDS  OUTPUT ROOM='CONFERENCE ROOM'
```

SEGMENT=*page_count*

Specifies that the output data set is to be segmented into separate data sets, where *page_count* specifies the number of pages to be included in each data set. Each data set is transmitted separately to the remote system, along with a segment ID, a number to indicate the position of the segment in the original data set.

Use this parameter only with line-mode data; do not use this parameter if you have requested conditional processing in the form definition because conditional processing is not supported across data-set boundaries.

Download for z/OS transmits the segment ID of each segmented data set to the remote system. InfoPrint Manager or Ricoh ProcessDirector can print the segment ID on the header, trailer, or separator pages, if the correct user exit is activated.

Default: The data set is not segmented.

Example:

```
//DD1  DD SEGMENT=100
```

SYSOUT=(*class***,,***form_name***)**

Specifies the class and form name.

class
Specifies a 1-character alphanumeric class.

form_name
Specifies a 1- to 4-character form name.

You can also specify the output class and form name in the CLASS and FORMS parameters of the OUTPUT statement. To specify a form name longer than 4 characters, you *must* use the FORMS parameter of an OUTPUT statement. See the description of the CLASS and FORMS parameters for more detail about these parameters.

Note: Although this parameter is optional, you must specify either a class, form name, or destination name to direct the output to a remote system and server.

Default: If you do not specify a class on either the OUTPUT or the DD statement, the default class is A. If you do not specify a form name on either the OUTPUT or the DD statement, JES uses an installation default.

Examples: This example specifies class R and form name BILL.

```
//DD1  DD SYSOUT=(R,,BILL)
```

To specify class in an OUTPUT statement instead of the DD statement, code a null value for the class in the SYSOUT parameter, as shown.

```
//OUTDS  OUTPUT CLASS=R
//DD3    DD      SYSOUT=(,),OUTPUT=(*.OUTDS)
```

TITLE=*title*

Specifies a 1- to 60-character description of the output data set to be sent to the remote server.

Default: None.

Example:

```
//OUTDS  OUTPUT TITLE='ANNUAL REPORT'
```

TRC=YES | NO

Specifies the TRC value to be sent to the remote server and indicates whether the print data set contains table reference characters (TRCs). You can also specify TRCs in the DCB parameter of the DD statement.

Default: If you do not specify DCB=OPTCD=J or the TRC parameter, the default is TRC=NO.

Example:

```
//OUTDS  OUTPUT TRC=YES
```

UCS=*font_name*

Specifies the name of one coded font to be sent to the remote server and used for a data set containing line data. Do not include the 2-character prefix of the coded-font name (X0 through XG).

You can specify a font name in either the CHARS parameter or the UCS parameter. If you specify a font in both parameters, the font on the CHARS parameter is used. If the page definition used to print a data set specifies a font:

- A remote PSF server uses fonts in this order:
  1. The font that is specified in a page definition that is specified using the PAGEDEF or FCB parameter, including the JES default FCB for the printer
  2. The font that is specified in the UCS parameter
  3. The font that is specified in a default page definition that is specified in the PSF startup procedure
- InfoPrint Manager and Ricoh ProcessDirector use the font that is specified in the page definition and ignore the font that is specified in the UCS parameter.

Default: If no fonts are specified in the page definition, and if you do not specify either the CHARS or UCS parameter, the default is the font that is specified during Download for z/OS configuration. If no default was specified, the remote print server uses the default font that is defined for the printer.

Examples: You can specify the UCS parameter on the DD and OUTPUT statements, as shown.

```
//DD1   DD UCS=60DB
//OUTDS  OUTPUT UCS=60DB
```

Understanding multi-data set job support

Download for z/OS sends each JES SYSOUT data set separately to the remote servers on other systems. By default, the servers on those systems spool each data set as a separate file.

On z/OS, an output group can contain multiple data sets. Some users who use Download for z/OS to send data sets to other systems want all of the data sets in an output group to print in sequence, with no intervening files, no NPRO processing between files, and only one header and trailer page for the set. InfoPrint Manager and Ricoh ProcessDirector users can enable the multi-data set function, which combines the data sets in a multi-data set job into a single job on the AIX, Linux, or Windows operating system.

To enable the multi-data set function, assemble and install sample exit APSUX15M as APSUX15 or sample exit APSUC15M as APSUC15. See *PSF for z/OS: Customization* for details.

Examples

This section contains examples that illustrate tasks that are specific to Download for z/OS, including:
- How to transmit an output data set to an AIX or Windows operating system and server
- How to transmit an output data set to multiple AIX or Windows operating systems or servers
- How to specify an application group name for OnDemand

The *PSF for z/OS: User's Guide* contains extensive examples that show how to use JCL to perform different printing tasks. Most of these examples apply when printing with InfoPrint Manager; the following examples do not apply:
- Specifying whether you want error messages to be printed

  Download for z/OS does not support the PIMSG JCL parameter, which you can use to suppress PSF error messages and request processing to stop when a certain number of errors occur. Print commands on an AIX and Windows operating system, by default, print all error messages.
- Printing with resources from a user library

  Download for z/OS does not support the USERLIB JCL parameter, which lets you use resources that are in a user library on a z/OS operating system. Instead, include these resources inline or arrange with the system administrator to make these resources accessible to the AIX or Windows operating system.

Directing output to a remote system and server

These examples show how to specify the class, destination, and form name in JCL statements to direct an output data set to a particular remote server.

Consult with your z/OS system programmer to determine the appropriate values to specify for the class, destination, and form name in your installation. You might not need to specify all three parameters. For example, by specifying a particular class, you can direct the output data set to the Download for z/OS FSA and also to a particular AIX or Windows operating system and server.

In the first example, assume that the system programmer has defined the following class value:

- Class R is a JES work-selection criterion for the Download for z/OS FSA.
- Class R is also a routing criterion that is defined in the routing-control data set. Class R is associated with the address of a particular remote system and server. See Figure 13 on page 36 for an example of a routing-control data set that defines class R as a routing criterion.

In the second and third examples, assume that the system programmer has defined these class, destination, and form values:

- Class R is a JES work-selection criterion for the Download for z/OS FSA.
- Destination AIXDEN and form name PSF6 are routing criteria that are defined in the routing-control data set. The destination and form name are associated with the address of a particular remote system and server.

Examples:

1. This example shows how to direct an output data set to a remote system and server by specifying output class R.

   ```
   //AFPUSERA JOB ...
   //STEP1    EXEC PGM=USERA
   //DD1      DD SYSOUT=R
   ```

2. This example shows how to direct an output data set to a remote system and server by specifying output class R, destination AIXDEN, and form name PSF6. This example shows how to specify these values on a DD statement.

   ```
   //AFPUSERA JOB ...
   //STEP1    EXEC PGM=USERA
   //DD1      DD SYSOUT=(R,,PSF6),DEST=AIXDEN
   ```

   Note: If the form name is more than 4 characters, you must specify the name on the OUTPUT statement, as shown in the third example.

3. This example shows how to direct an output data set to the same system and server as in the second example. However, this example shows how to specify these values on an OUTPUT statement. Note that the DD statement must see the OUTPUT statement. Also, the DD statement must include a null class value when you specify the class on the OUTPUT statement.

   ```
   //AFPUSERA JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT CLASS=R,FORMS=PSF6,DEST=AIXDEN
   //DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
   ```

Directing output to multiple systems or servers

This example shows how to specify multiple OUTPUT statements to transmit an output data set to different systems or to different servers on one system at the same time.

In this example, assume that the system programmer has defined these class, destination, and form values:

- Class R is a JES work-selection criterion for the Download for z/OS FSA.
- Destinations AIXDEN, WINSEAT1, and AIXSEAT2 are routing criteria that are defined in the routing-control data set. Each destination name is associated with the address of a different AIX or Windows operating system or server.

Note: Contact your system programmer to determine the appropriate values to specify for the class, destination, and form name in your installation.

This example shows how to request that Download for z/OS transmit an output data set three times:

1. The first transmission is to the AIX server that is identified with destination AIXDEN.
2. The second transmission is to the Windows server that is identified with destination WINSEAT1.
3. The third transmission is to the AIX server that is identified with destination AIXSEAT2.

The OUTPUT parameter on the DD statement references three OUTPUT JCL statements; therefore, Download for z/OS transmits the data set three times. Because class R is the class for all three transmissions, this example specifies the class in the DD statement. However, because the destination name is different for each transmission, this example specifies the destination on the three OUTPUT statements.

```
//AFPUSERA JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT DEST=AIXDEN
//OUTDS2   OUTPUT DEST=WINSEAT1
//OUTDS3   OUTPUT DEST=AIXSEAT2
//DD1      DD SYSOUT=(R),OUTPUT=(*.OUTDS1,*.OUTDS2,*.OUTDS3)
```

Specifying an application group name to the OnDemand server

This example shows how you might pass an application group name to the OnDemand server.

Note: Contact the OnDemand system administrator to determine in which parameter to pass an option such as the application group name.

In this example, assume that the system programmer has defined the following class value:
- Class R is a JES work-selection criterion for the Download for z/OS FSA.
- Class R is also a routing criterion that is defined in the routing-control data set. Class R is associated with the address of an OnDemand server.

Assume that the application group name you want to pass to OnDemand is STUDENTS.

This example shows how to pass the application group name in the FORMS parameter.

```
//AFPUSERA JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT FORMS=STUDENTS
//DD1      DD SYSOUT=(R),OUTPUT=(*.OUTDS1)
```

Chapter 5. Diagnosing errors in Download for z/OS

This chapter contains information to help the diagnostician identify a problem in the Download for z/OS feature and report it to IBM. This chapter describes:
- Using the PSF for z/OS trace facility with Download for z/OS
- Using the PSF for z/OS dump facility with Download for z/OS
- Displaying the TCP/IP connection status
- The message to module cross-reference table

Before you use the PSF trace and dump facilities, determine whether the problem you have encountered is one that other users have reported and that has been fixed. See the *PSF for z/OS: Diagnosis* for information about how to construct a keyword string to search in IBMLink. If you determine that your problem has not already been reported, see the *PSF for z/OS: Diagnosis* for information about how to prepare an APAR.

The messages and abend codes that are issued by Download for z/OS are described in *PSF for z/OS: Messages and Codes*.

Using the PSF trace facility

You can use the same trace facilities as you use with PSF for z/OS. These facilities are described in detail in *PSF for z/OS: Diagnosis*. This section provides examples of traces you can perform and an overview of the trace facilities available for Download for z/OS.

You specify trace parameters in the Download for z/OS startup procedure and on the MODIFY operator command. If you suspect the problem is in the Download for z/OS feature, IBM suggests that you request an FSA full external trace, tracing all components. An FSA full external trace includes an internal wrap trace and a recording of all events occurring on the functional subsystem interface (FSI). Download for z/OS does not have a separate component identifier.

Examples of traces

This section shows examples of traces you can perform.

Starting a trace while Download for z/OS is running

To obtain a full external trace and direct the trace data to a Generalized Trace Facility (GTF) data set, follow this procedure:

1. Start GTF, requesting USR records of type FD0 and FD4.
2. In the Download for z/OS startup procedure, specify PARM=(,INTR) on the EXEC statement and TRACE=YES on the PRINTDEV statement for the FSA you want to trace, so that you obtain an internal trace starting at FSS initialization. These are the default values, so you can omit the PARM parameter and the TRACE parameter. For information about tracing parameters in the startup procedure, see "Startup procedure JCL statements" on page 24.
3. Start the Download for z/OS FSA.
4. Enter this PSF operator interface command to start a full external trace:
   ```
   MODIFY fss_name,TRACEON,fsa_name,FORMAT=GTF,MODE=FULL
   ```

where *fss_name* is the name of the Download for z/OS FSS, and *fsa_name* is the name of the FSA you want to trace.

5. Run the failing job.
6. Enter this PSF operator interface command to end the trace:

   MODIFY *fss_name*,TRACEOFF,*fsa_name*

   where *fss_name* is the name of the Download for z/OS FSS, and *fsa_name* is the name of the FSA.

7. Stop GTF.

Starting a trace at initialization of Download for z/OS

To obtain a full external trace that begins during the startup procedure for Download for z/OS and direct the trace output to a PSF trace data set, follow this procedure:

1. In the Download for z/OS startup procedure, specify TRACE=YES on the PRINTDEV statement for the FSA you want to trace, so that tracing starts during FSS initialization. TRACE=YES is the default, so you can omit the TRACE parameter. For information about tracing parameters in the startup procedure, see "Startup procedure JCL statements" on page 24.

2. In the startup procedure, include a DD statement to allocate a PSF trace data set. The name of the DD statement must match the name of the FSA to be traced. See "Allocating a PSF trace data set" for more information.

3. For some problems, IBM support might ask you to also include a DD statement to allocate an FSS trace data set (also called an NST trace data set). Specify the name of the DD statement in the PARM parameter, as shown in Step 4. See "Allocating an FSS trace data set" on page 75 for more information.

4. In the startup procedure, specify the PARM=(,FULL) parameter on the EXEC statement:

   //*stepname* EXEC PGM=APSKAFPD,PARM=(,FULL)

   If you have allocated an FSS trace data set, also specify the name of the DD statement for the data set:

   //*stepname* EXEC PGM=APSKAFPD,PARM=(*FSSddname*,FULL)

   where *FSSddname* is the name of the DD statement for the FSS trace data set.

5. Run the failing job.
6. Enter this PSF operator interface command to end the trace:

   MODIFY *fss_name*,TRACEOFF,*fsa_name*

   where *fss_name* is the name of the Download for z/OS FSS, and *fsa_name* is the name of the FSA.

Allocating a PSF trace data set

You can direct trace output either to a GTF data set or to a PSF trace data set; however, you must direct trace output to a PSF trace data set if you start tracing during initialization of PSF. To direct the trace to a PSF trace data set, specify a DD statement for the PSF trace data set in the Download for z/OS startup procedure. The name of this DD statement must be the name of the FSA you want to trace; that is, the name must match the name on the PRINTDEV statement. Include a DD statement for each FSA you want to trace.

When you allocate a PSF trace data set, specify these DCB parameters:
• Record length of 80

- Block size that is a multiple of 80; for better performance, 27920 is recommended
- Record format of either F, U, or FB
- Sequential organization (PS)

The size of the trace data set depends on the size of the data sets being transmitted because the transmitted data is part of the trace. You must allocate larger trace data sets for larger data sets. This example allocates a trace data set with a record format of FB, a record length of 80, a block size of 27920, a primary space allocation of five cylinders, and a secondary space allocation of 10 cylinders:

```
//ddname  DD  DSNAME=DOWNLOAD.TRACE,UNIT=3390,VOL=SER=SYS000,
//            DISP=(NEW,KEEP,CATLG),SPACE=(CYL,(5,10),RLSE)
//            DCB=BLKSIZE=27920
```

where *ddname* is the name of the FSA you want to trace.

Allocating an FSS trace data set

Download for z/OS makes more trace entries during the initialization of the FSS than PSF does, and Download for z/OS directs these trace entries to an FSS trace data set (also called an NST trace data set). This means that to trace some problems, you might need to allocate an FSS trace data set and a PSF trace data set.

Specify the name of the DD statement for the FSS trace data set in the EXEC statement of the Download for z/OS startup procedure. For example:

```
//step_name EXEC PGM=APSKAFPD,PARM=(FSSddname,FULL)
```

where:

FSSddname is the name of the DD statement that allocates the FSS trace data set

When you allocate an FSS trace data set, specify these DCB parameters:
- Record length of 80
- Block size that is a multiple of 80; for better performance, 27920 is recommended
- Record format of either F, U, or FB
- Sequential organization (PS)

Formatting trace data in a PSF trace data set

The trace output contains unformatted data. You can format the PSF trace data set by using the PSF trace post formatter program, APSTRFMT, which is included in SYS1.SAMPLIB. You must stop Download for z/OS before formatting the trace data. Figure 18 on page 76 shows sample JCL to start the PSF trace post formatter.

```
//APSWTRCF JOB 'ACCOUNT #','NAME',MSGLEVEL=(1,1)
//****************************************************************
//* PSF TRACE FORMATTER INVOCATION JCL
//****************************************************************
//STEP01   EXEC PGM=APSTRFMT,REGION=100K
//*                          /* REGION = (3 * BLKSIZE) + 20K
//SYSUDUMP DD SYSOUT=*       /* BLKSIZE = TRACEIN BLOCKSIZE
//TRACEIN  DD UNIT=unit,     /* UNIT CAN BE TAPE OR DASD
//            DSN=tracein,    /* SET TO PSF TRACE DATA SET NAME
//            DISP=SHR,
//            VOL=SER=volser /* SERIAL NUMBER OF VOLUME
//TRACEOUT DD UNIT=unit,     /* UNIT MIGHT BE TAPE OR DASD
//            DSN=traceout,   /* SET TO DATA SET NAME WHERE
//*                              FORMATTED RECORDS ARE PLACED
//            DISP=disp,     /* DISPOSITION OF TRACE OUT
//            VOL=SER=volser /* SERIAL NUMBER OF VOLUME
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
      TYPE=SHORT
/*
//
```

Figure 18. Sample JCL for starting the PSF trace formatter

The TRACEIN DD statement identifies the trace data set that contains the trace data; therefore, specify the attributes of that data set in the DD statement.

The TRACEOUT DD statement identifies the data set into which the formatted trace output is stored. The parameters that are specified on the DD statement are device-dependent. Specify these DCB parameters:
- Record length of 117, which is the default.
- Block size that is a multiple of 117. If it is not specified, or is not a multiple of 117, it defaults to 1287.
- Record format of FBA, U, or FB. The default is FBA.
- Sequential organization (PS).

You can specify three TYPE options on the SYSIN DD statement:

SHORT   Excludes some PSF data, specifically PPCC trace entries. For some entries, only the first 32 bytes of data are traced. In a truncated entry, a '<' is placed in the space between the address and the start of the data in the trace output data set. This is the default.

TITLES   Only headers are printed for the trace entry being formatted.

LONG   All data is included in the trace data set.

Formatting and printing GTF trace data

You can print GTF trace data sets by using the Interactive Problem Control System (IPCS). You can also use IPCS with the COMMANDS parameter GTF USR(FD1) to view the data at a display terminal. For more information about using IPCS, see *z/OS MVS IPCS User's Guide*.

Using the PSF dump facility

You can use the same dump facilities as you use with PSF for z/OS. These facilities are described in detail in *PSF for z/OS: Diagnosis*.

As with PSF for z/OS, you can request a conditional memory dump of PSF control blocks by specifying the DUMP parameter on the PRINTDEV statement in the

Download for z/OS startup procedure. See "PRINTDEV parameters" on page 25 for more information about the PRINTDEV statement.

You can request that a conditional dump occur when:
- A PSF reason code or restartable abend reason code occurs
- A specific PSF or Download message is issued

A conditional dump causes a Download for z/OS abend. The dump goes directly to SYS1.DUMPxx; you can print or view it by using IPCS.

In this example, a dump occurs the second time message APS986I is issued:
```
DUMP=(,APS986I,2)
```

Displaying the TCP/IP connection status

You might need to display the TCP/IP connection status in these situations:
- When Download for z/OS does not complete a selected job.
- When Download for z/OS does not seem to be responding.
- When you must determine if Download for z/OS is waiting to send data to the remote server or waiting for a response from the remote server.
- When you must know if a session exists between Download for z/OS and the remote server. A new session is created for each new job or data set.

To display the TCP/IP status, use the MODIFY (or F) command with the DISPLAY and STATUS=TCPIP parameters. The syntax of the command is:
```
{MODIFY | F}  fss_name,DISPLAY,[fsa_name],STATUS=TCPIP
```

Figure 19 shows a display sample with a TCP/IP STATUS of "DESTINATION CONNECTED" and a PENDING COMMAND of "SELECT-READ". This example means that Download for z/OS has sent all the data that it can and is waiting for a response from the remote server. In this case, check for errors on the remote server.

```
                                                        PENDING
    FSANAME........... TCP/IP STATUS....................... COMMANDS.....
    PRT619  READY      TCP/IP IS ACTIVE                     SELECT-READ
                       DESTINATION CONNECTED
```

Figure 19. Download for z/OS waiting for a response (sample)

Figure 20 shows a display sample with a TCP/IP STATUS of "DESTINATION CONNECTED" and a PENDING COMMAND of "SELECT-WRITE". This example means that Download for z/OS wants to send data, but TCP/IP cannot accept more data. In this case, check to see if the file system is full on the remote server.

```
                                                        PENDING
    FSANAME........... TCP/IP STATUS....................... COMMANDS.....
    PRT619  READY      TCP/IP IS ACTIVE                     SELECT-WRITE
                       DESTINATION CONNECTED
```

Figure 20. Download for z/OS waiting for TCP/IP buffers (sample)

See "Displaying TCP/IP status" on page 42 for more information about using the display TCP/IP status command and interpreting the output.

Message-to-module cross-reference

For a list of the messages that are issued by Download for z/OS and the modules that produce each message, see *PSF for z/OS: Diagnosis*.

Appendix A. Checklist of Download for z/OS configuration tasks

This checklist summarizes the tasks that are involved in configuring the Download for z/OS feature for your installation, along with the number of the page that describes the task:

__ 1. Verify that the software prerequisites are met; see page 8.

__ 2. Install the Download for z/OS program; see the *Program Directory for Download for z/OS*, GI10-0283.

__ 3. Enable Download for z/OS in the SYS1.PARMLIB member; see page 8.

__ 4. Plan the Download for z/OS functional subsystem.

    __ a. Decide how many functional subsystems (FSS) and functional subsystem applications (FSAs) to create; see page 10.

    __ b. Determine the region size for each FSS; see page 10.

    __ c. Decide on the JES work-selection criteria for each FSA; see page 10.

    __ d. Decide on a default checkpointing interval for each FSA; see page 11.

    __ e. Decide on default printing options, if any, for each FSA; see page 12.

__ 5. Define the Download for z/OS functional subsystem.

    • JES2

      __ a. Create an FSS(*fss_name*) statement for each FSS; see page 15.

      __ b. Create a PRT(*nnnn*) statement for each FSA; see page 16.

    • JES3

      __ a. Create an FSSDEF statement for each FSS; see page 19.

      __ b. Create a DEVICE statement for each FSA; see page 19.

__ 6. Create a startup procedure for each Download for z/OS FSS; see page 23.

__ 7. Associate each Download for z/OS FSS with a RACF user ID; see page 28.

__ 8. Create a routing-control data set.

    __ a. Decide on routing criteria to use for each server; see page 29.

    __ b. Determine the socket address of each associated server; see page 30.

    __ c. Allocate the routing-control data set; see page 30.

    __ d. Specify the routing-control statements; see page 31.

    __ e. Test the routing-control data set; see page 36.

__ 9. Write an exit routine to pass more job information to remote print servers, if necessary; see page 37.

__ 10. Modify installation accounting routines, if necessary; see page 37.

__ 11. Review defaults for the program properties table (PPT); see page 28.

__ 12. Activate the Download for z/OS code in SYS1.LINKLIB by either IPLing the z/OS system or using system commands to pick up the changes to SYS1.LINKLIB and the program properties table.

__ 13. Start the servers and Download for z/OS; see page 39.

Appendix B. Installation verification program example

Figure 21 is a sample of the printed installation verification program (IVP) for Download for z/OS.
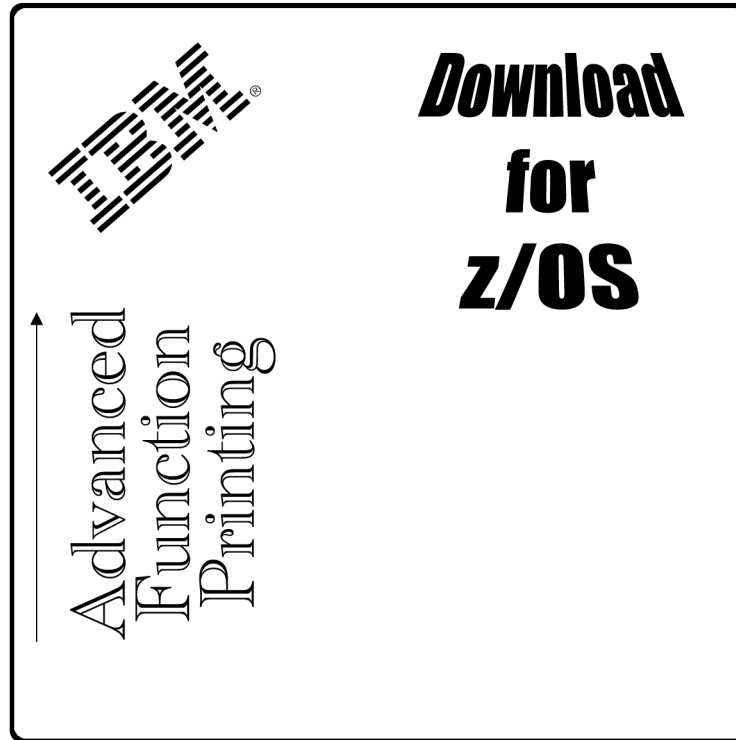
Figure 21. IVP example for Download for z/OS

Appendix C. Accessibility

Accessible publications for this product are offered through the z/OS Information Center, which is available at http://www.ibm.com/systems/z/os/zos/bkserv/. If you experience any accessibility problems with the z/OS Information Center, send an email to mhvrcfs@us.ibm.com or write to the following address:

IBM Corporation
Attention: MHVRCFS Reader Comments
Department H6MA, Building 707
2455 South Road
Poughkeepsie, NY 12601-5400
USA

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, use software products successfully. The major accessibility features in z/OS let users:

- Use assistive technologies such as screen readers and screen magnifier software.
- Operate specific or equivalent features by using only the keyboard.
- Customize display attributes such as color, contrast, and font size.

Using assistive technologies

Assistive technology products, such as screen readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using such products to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces by using TSO/E or ISPF. For more information, see *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Vol I*. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

Notices

This information was developed for products and services offered in the U.S.A. or elsewhere.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10594-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan, Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

Site Counsel
IBM Corporation
2455 South Road
Poughkeepsie, NY 12601-5400
USA

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

COPYRIGHT LICENSE:

This information might contain sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

Policy for unsupported hardware

Various z/OS elements, such as DFSMS, HCD, JES2, JES3, and MVS, contain code that supports specific hardware servers or devices. In some cases, this device-related element support remains in the product even after the hardware devices pass their announced End of Service date. z/OS may continue to service element code; however, it will not provide service related to unsupported hardware devices. Software problems related to these devices will not be accepted

for service, and current service activity will cease if a problem is determined to be associated with out-of-support devices. In such cases, fixes will not be issued.

Minimum supported hardware

The minimum supported hardware for z/OS releases identified in z/OS announcements can subsequently change when service for particular servers or devices is withdrawn. Likewise, the levels of other software products supported on a particular release of z/OS are subject to the service support lifecycle of those products. Therefore, z/OS and its product publications (for example, panels, samples, messages, and product documentation) can include references to hardware and software that is no longer supported.

- For information about z/OS software support lifecycles, see the web page at:

  http://www.ibm.com/software/support/systemsz/lifecycle/

- For information about currently-supported IBM hardware, contact your IBM representative.

Programming interfaces

This publication includes documentation of intended programming interfaces that the customer can use to write programs to obtain the services of PSF for z/OS.

Trademarks

IBM, the IBM logo, and ibm.com® are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Copyright and trademark information web page at:

http://www.ibm.com/legal/copytrade.shtml

Adobe and PostScript are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Glossary

This glossary defines technical terms and abbreviations used in PSF for z/OS documentation. If you do not find the term you are looking for, view the IBM terminology website at:

http://www.ibm.com/software/globalization/terminology/

These cross-references are used in this glossary:

- **See.** Refers to preferred synonyms or to defined terms for acronyms and abbreviations.
- **See also.** Refers to related terms that have similar, but not synonymous, meanings, or to contrasted terms that have opposite or substantively different meanings.

A

ACIF. See AFP Conversion and Indexing Facility.

Advanced Function Presentation (AFP). A set of licensed programs, together with user applications, that use the all-points-addressable concept to print data on a wide variety of printers or to display data on a variety of display devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information.

Advanced Interactive Executive (AIX). A UNIX operating system developed by IBM that is designed and optimized to run on POWER® microprocessor-based hardware, such as servers, workstations, and blades.

AFP. See Advanced Function Presentation.

AFP Conversion and Indexing Facility (ACIF). An optional feature of PSF for z/OS that converts a print file into a MO:DCA document, creates an index file for later retrieval and viewing, and retrieves resources used by an AFP document into a separate file.

AFP Download Plus. An optional feature of PSF for z/OS that distributes AFP data from a z/OS operating system to an AIX, Windows, Linux, or other z/OS operating system for printing, emailing, or faxing, or to an OnDemand server for archiving.

AIX. See Advanced Interactive Executive.

API. See application programming interface.

application programming interface (API). An interface that allows an application program that is written in a high-level language to use specific data or functions of the operating system or another program.

B

burst. To separate continuous-forms paper into separate sheets.

C

carriage control character. A character that is used to specify a write, space, or skip operation. See also control character.

case-sensitive. Pertaining to the ability to distinguish between uppercase and lowercase letters.

checkpoint. A place in a program at which a check is made, or at which a recording of data is made to allow the program to be restarted in case of interruption.

client. A software program or computer that requests access to data, services, programs, and resources from a server. See also server and host.

client/server. Pertaining to the model of interaction in distributed data processing in which a program on one computer sends a request to a program on another program and awaits a response. The requesting program is called a client; the answering program is called a server.

coexistence. The ability of two or more entities to function in the same system or network.

colon hexadecimal notation. The syntactical representation for a 128-bit integer that consists of eight groups of four hexadecimal numbers, separated by colons. IP addresses can be represented in colon hexadecimal notation. See also dotted decimal notation and host name.

conditional processing. A page definition function that allows input data records to partially control their own formatting.

connection. In data communication, an association established between entities for conveying information.

Content Manager OnDemand. An IBM program that you can use to automatically capture, index, archive, search, retrieve, present, and reproduce stored computer-generated documents and other business-related data.

control character. (1) A character that represents a command that is sent to an output device, such as a printer or monitor. Examples are line-feed, shift-in, shift-out, carriage return, font change, and end of transmission. See also carriage control character. (2) A

character whose occurrence in a particular context initiates, modifies, or stops a control function.

copy group. An internal object in a form definition or a print data set that controls such items as modifications to a form, page placement, and overlays.

D

daemon. A program that runs unattended to perform continuous or periodic functions, such as network control.

data check. A synchronous or asynchronous indication of a condition caused by erroneous data or incorrect positioning of data. Some data checks can be suppressed.

data object resource. An object container resource or IOCA image resource that is either printer resident or downloaded. Data object resources can be:

- Used to prepare for the presentation of a data object, such as with a resident color profile resource object
- Included in a page or overlay through the Include Object (IOB) structured field; for example, PDF single-page and multiple-page objects, Encapsulated PostScript (EPS) objects, and IOCA images
- Called from within a data object; for example, PDF resource objects

data stream. The commands, control codes, data, or structured fields that are transmitted between an application program and a device, such as printer or nonprogrammable display station.

default. Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

destination control file. In a Windows environment, a user-modifiable file for simpler mapping of JCL to InfoPrint Manager parameters.

dotted decimal notation. The syntactical representation for a 32-bit integer that consists of four 8-bit numbers written in base 10 and separated by periods (dots). IP addresses can be represented in dotted decimal notation. See also colon hexadecimal notation and host name.

double-byte coded font. A font in which the characters are defined by 2 bytes. The first byte defines the coded font section; the second byte defines the code point in the code page specified for that section. See also single-byte coded font.

download. To transfer data from a computer to a connected device, such as a workstation or a printer. Typically, users download from a large computer to a diskette or fixed disk on a smaller computer or from a system unit to an adapter.

Download for z/OS. An optional feature of PSF for z/OS that uses TCP/IP to automatically send data sets from the JES spool, without formatting them, directly to a PSF for z/OS, InfoPrint Manager, Ricoh ProcessDirector, or OnDemand server.

drain. An operator action to halt the flow of jobs to a printer, typically to stop the printer or to change print options.

E

electronic form. A collection of constant data that is electronically composed in the host processor and can be merged with variable data on a page during printing.

exception highlighting. The markings placed on the printed page to indicate the location of a data-stream error.

exit routine. A program that receives control from another program in order to perform specific functions.

F

font. (1) A family or assortment of characters of a given size and style, for example, 9-point Bodoni modern. A font has a unique name and might have a registry number. (2) A particular type style (for example, Bodoni or Times Roman) that contains definitions of character sets, marker sets, and pattern sets.

form definition. An AFP resource object used by PSF that defines the characteristics of the form or printed media, including: overlays to be used, duplex printing, text suppression, the position of composed-text data on the form, and the number and modifications of a page.

FSA. See functional subsystem application.

FSS. See functional subsystem.

functional subsystem (FSS). An extension of JES that runs in an address space separate from the JES address space. An FSS provides support for an auxiliary function to JES processing, such as a peripheral device or other component.

functional subsystem application (FSA). (1) An area within the functional subsystem (FSS) that drives and manages a single printer. FSAs are identified with JES printer definitions. (2) An application that uses the support facilities of the functional subsystem (FSS) to communicate with JES.

H

host. (1) A computer that is connected to a network and provides an access point to that network. The host

can be a client, a server, or both a client and server simultaneously. See also client and server. (2) In TCP/IP, any system that has at least one Internet address associated with it.

host address.   See Internet Protocol address.

host name.   The network name given to a computer. Sometimes, host name is used to mean the fully qualified domain name; other times, it is used to mean the most specific subname of a fully qualified domain name. For example, if `mycomputer.city.company.com` is the fully qualified domain name, either of these host names can be used: `mycomputer.city.company.com` or `mycomputer`. See also colon hexadecimal notation and dotted decimal notation.

host system.   See host.

I

InfoPrint Manager.   A print management product that runs on an AIX, Linux, or Windows operating system. InfoPrint Manager handles the scheduling, archiving, retrieving, and assembly of a print job and its related resource files. It also tracks the finishing and packaging of the printed product.

InfoPrint ProcessDirector.   A print management product that runs on AIX, Linux, and Windows operating systems. InfoPrint ProcessDirector supports job submission from z/OS host systems by using Download for z/OS and AFP Download Plus and from other systems that use file copying methods or the **lpd** protocol. See also Ricoh ProcessDirector.

inline resource.   A resource contained in a print file or a print data set.

Internet Protocol (IP).   A protocol that routes data through a network or interconnected networks. This protocol acts as an intermediary between the higher protocol layers and the physical network. See also Transmission Control Protocol and Transmission Control Protocol/Internet Protocol.

Internet Protocol (IP) address.   A unique address for a device or logical unit on a network that uses the IP standard. See also colon hexadecimal notation, dotted decimal notation, and host name.

IP.   See Internet Protocol.

J

JCL.   See job control language.

JES.   See Job Entry Subsystem.

JES2.   An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for processing, processes their output, and purges them

from the system. In an installation with more than one processor, each JES2 processor independently controls its job input, scheduling, and output processing. See also Job Entry Subsystem and JES3.

JES3.   An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for processing, processes their output, and purges them from the system. In complexes that have several loosely coupled processing units, the JES3 program manages processors so that the global processor exercises centralized control over the local processors and distributes jobs to them by using a common job queue. See also Job Entry Subsystem and JES2.

job control language (JCL).   A command language that identifies a job to an operating system and describes the job's requirements.

Job Entry Subsystem (JES).   An IBM licensed program that receives jobs into the system and processes all output data that is produced by jobs. See also JES2 and JES3.

job script.   A pre-defined file similar to a shell script that contains the options required to run a print job.

L

line data.   Data prepared for printing on a line printer without any data placement or presentation information. Line data can contain carriage-control characters and table-reference characters (TRC) for spacing and font selections. See also record format line data and traditional line data.

line printer daemon (LPD).   The printer server that lets other hosts access its printer.

LPD.   See line printer daemon.

M

migration.   The movement of data when software is upgraded or the data is transferred to a different hardware server or model.

Mixed Object Document Content Architecture (MO:DCA).   An architected, device-independent data stream for interchanging documents.

Mixed Object Document Content Architecture for Presentation (MO:DCA-P).   The subset of MO:DCA that defines presentation documents. PSF supports MO:DCA Presentation Interchange Set data streams.

MO:DCA.   See Mixed Object Document Content Architecture.

MO:DCA data.   Print data that has been composed into pages. Text-formatting programs (such as DCF) can produce composed text data consisting entirely of

structured fields. ACIF or AFP Download Plus can transform line data or XML data to MO:DCA data.

MO:DCA-P. See Mixed Object Document Content Architecture for Presentation.

MO:DCA IS/1. See MO:DCA Presentation Interchange Set 1.

MO:DCA IS/3. See MO:DCA Presentation Interchange Set 3.

MO:DCA Presentation Interchange Set 1 (MO:DCA IS/1). A subset of MO:DCA that defines an interchange format for presentation documents.

MO:DCA Presentation Interchange Set 3 (MO:DCA IS/3). A subset of MO:DCA that defines an interchange format for presentation documents. The MO:DCA IS/3 data stream includes structured fields that are not found in MO:DCA IS/1.

mount. To make a file system accessible.

Multiple Virtual Storage (MVS). An IBM operating system that accesses multiple address spaces in virtual storage.

N

network. In data communications, a configuration in which two or more locations are physically connected for the purpose of exchanging data.

Network File System (NFS). A protocol that lets a computer access files over a network as if they were on its local disks.

Network Print Facility (NPF). A feature that routes VTAM®, JES2, or JES3 printer output to printers in an Internet Protocol network.

NFS. See Network File System.

NPF. See Network Print Facility.

O

output writer. A part of JES that receives job output from the system spool.

P

page definition. An AFP resource object used by PSF that defines the rules for transforming line data and XML data into MO:DCA data and text controls, such as width of margins and text orientation.

parameter. A value or reference passed to a function, command, or program that serves as input or controls actions. The value is supplied by a user or by another program or process.

port. (1) A hardware interface to which an I/O device is attached for the purpose of sending and receiving data. (2) An end point for communication between applications, generally referring to a logical connection. A port provides queues for sending and receiving data. Each port has a port number for identification.

PostScript. A page description language developed by Adobe Systems, Incorporated that describes how text and graphics are presented on printers and display devices.

Printer Control Language (PCL). The Hewlett Packard page description language that is used in laser and ink-jet printers.

print queue. A list of print jobs waiting to be printed.

Print Services Facility (PSF). An IBM licensed program that manages and controls the input data stream and output data stream required by supported page printers.

protocol. A set of rules controlling the communication and transfer of data between two or more devices or systems in a communications network.

PSF. See Print Services Facility.

R

record format line data. A form of line data where each record is preceded by a 10-byte identifier. See also line data.

resource. A collection of printing instructions used, in addition to the print data set, to produce the printed output. Resources include coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions.

Ricoh ProcessDirector. A print management product, formerly named InfoPrint ProcessDirector, that runs on AIX, Linux, and Windows operating systems. Ricoh ProcessDirector supports job submission from z/OS host systems by using Download for z/OS and AFP Download Plus and from other systems that use file copying methods or the **lpd** protocol.

routing-control data set. A data set containing routing statements that associate routing criteria of class, destination, and form name with the socket addresses of remote servers.

S

SDSF. See System Display and Search Facility.

server. A software program or a computer that provides services to other software programs or other

computers. The program or computer making the request of the server is typically called the client. See also client and host.

shell script. A program or script, that is interpreted by the shell of an operating system.

shift-out, shift-in (SOSI). Special EBCDIC or ASCII characters that exist in the data stream to indicate the switches between double-byte fonts and single-byte fonts.

single-byte coded font. A font in which the characters are defined by a 1-byte code point. A single-byte coded font has only one coded font section. See also double-byte coded font.

SMF. See System Management Facilities.

SNA. See Systems Network Architecture.

socket address. A data structure that uniquely identifies a specific communications end point. It also specifies the protocol family. For example, a TCP/IP socket address consists of a port number and a host address.

SOSI. See shift-out, shift-in.

spool. The system function of putting files or jobs into disk storage for later processing or printing. An abbreviation for "simultaneous peripheral operations online."

startup procedure. A program used to start an application and to specify initialization parameters, libraries that contain system resources, and routing-control information.

syntax. The rules for the construction of a command or statement.

System Display and Search Facility (SDSF). An IBM licensed program that provides a menu-driven, full-screen interface that is used to obtain detailed information about jobs and resources in a system.

System Management Facilities (SMF). A component of z/OS that collects and records a variety of system and job-related information. Examples of information collected by SMF are statistics, accounting information, and performance data.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the networks and controlling the configuration and operation of networks. The layered structure of SNA allows the ultimate origins and destinations of information (the users) to be independent of and unaffected by the specific SNA network services and facilities that are used for information exchange.

T

table reference character (TRC). A numeric character corresponding to the order in which font character sets have been specified. The TRC is used to select a font character set during printing.

TCP. See Transmission Control Protocol.

TCP/IP. See Transmission Control Protocol/Internet Protocol.

trace. (1) A record of the processing of a computer program or transaction. The information collected from a trace can be used to assess problems and performance. (2) A DB2® for z/OS facility that provides the ability to collect monitoring, auditing, performance, accounting, statistics, and serviceability (global) data.

traditional line data. A form of line data that is prepared for printing on a line printer. See also line data.

Transmission Control Protocol (TCP). A communications protocol used in the Internet and in any network that follows the Internet Engineering Task Force (IETF) standards for internetwork protocol. TCP provides a reliable host-to-host protocol in packet-switched communications networks and in interconnected systems of such networks. See also Internet Protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). An industry-standard, nonproprietary set of communications protocols that provide reliable end-to-end connections between applications over interconnected networks of different types.

TRC. See table reference character.

U

UCS. See universal character set.

universal character set (UCS). A printer feature that permits the use of a variety of character arrays. See font.

V

Virtual Telecommunications Access Method (VTAM). An IBM licensed program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability.

VTAM. See Virtual Telecommunications Access Method.

X

XML data. Data identified with the Extensible Markup Language (XML), which is a standard metalanguage for defining markup languages that is based on Standard Generalized Markup Language (SGML). For printing on page printers, a page definition is required to provide the data placement and presentation information. The XML data processed by PSF can be encoded in EBCDIC, ASCII, UTF-8 or UTF-16.

Z

z/OS. An IBM mainframe operating system that uses 64-bit real storage.

Bibliography

This bibliography lists the titles of publications containing additional information about PSF, AFP, the z/OS operating system, InfoPrint Manager, and related products.

The titles and order numbers might change from time to time. To verify the current title or order number, consult your IBM marketing representative.

You can obtain many of the publications listed in this bibliography from the AFP Consortium, `http://www.afpcinc.org`, and the z/OS printing software web page:
`http://www.ibm.com/systems/z/zos/printsoftware/supportmanuals_ww.html`

You can obtain InfoPrint Manager and Ricoh ProcessDirector publications from the Ricoh Production Print Information Center: `http://rpp.ricoh-usa.com/help/index.jsp`

Advanced Function Presentation (AFP)

Publication	Order Number
AFP Toolbox User's Guide	S544-5292
Guide to Advanced Function Presentation	G544-3876
Overlay Generation Language User's Guide and Reference	S544-3702
Architecture	
Advanced Function Presentation: Programming Guide and Line Data Reference	S544-3884
AFP Consortium: AFP Color Management Architecture (ACMA)	AFPCC
Bar Code Object Content Architecture Reference	AFPC-0005
Color Management Object Content Architecture Reference	AFPC-0006
Font Object Content Architecture Reference	S544-3285
Graphics Object Content Architecture for Advanced Function Presentation Reference	AFPC-0008
Image Object Content Architecture Reference	AFPC-0003
Intelligent Printer Data Stream Reference	AFPC-0001
Mixed Object Document Content Architecture Reference	AFPC-0004
Presentation Text Object Content Architecture Reference	SC31-6803
Fonts	
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM Infoprint Fonts: Font Summary	G544-5846
z/OS Font Collection	GA32-1048

Print Management

Publication	Order Number
InfoPrint Manager for AIX: Getting Started	G550-1061

Publication	Order Number
InfoPrint Manager for AIX: Introduction and Planning Guide	G550-1060
InfoPrint Manager for AIX: Procedures	G550-1066
InfoPrint Manager for Linux: Getting Started	G550-20263
InfoPrint Manager for Linux: Introduction and Planning Guide	G550-20262
InfoPrint Manager for Linux: Procedures	G550-20264
InfoPrint Manager for Windows: Getting Started	G550-1072
InfoPrint Manager for Windows: Introduction and Planning Guide	G550-1071
InfoPrint Manager for Windows: Procedures	G550-1073
InfoPrint Manager: Reference	S550-1052
InfoPrint Manager: Publications	SK4T-4017
Ricoh ProcessDirector for AIX: Planning and Installing	G550-1045
Ricoh ProcessDirector for AIX: Publications	GK4T-4011
Ricoh ProcessDirector for Linux: Planning and Installing	G550-1042
Ricoh ProcessDirector for Linux: Publications	GK4T-4007
Ricoh ProcessDirector for Windows: Planning and Installing	G550-1365
Ricoh ProcessDirector for Windows: Publications	GK4T-4107

Content Manager OnDemand

Publication	Order Number
IBM DB2 Content Manager OnDemand for Multiplatforms: Administration Guide	SC18-9237
IBM DB2 Content Manager OnDemand for Multiplatforms: Indexing Reference	SC18-9235
IBM DB2 Content Manager OnDemand for Multiplatforms: Installation and Configuration Guide	SC18-9232
IBM DB2 Content Manager OnDemand for Multiplatforms: Introduction and Planning Guide	GC18-9236
IBM DB2 Content Manager OnDemand: Messages and Codes	SC27-1379
IBM DB2 Content Manager OnDemand: Report Distribution Installation, Use, Reference	SC18-9233
IBM DB2 Content Manager OnDemand: User's Guide	SC27-0836
IBM DB2 Content Manager OnDemand for Multiplatforms: Web Enablement Kit Implementation Guide	SC18-9231
IBM DB2 Content Manager OnDemand: Windows Client Customization Guide	SC27-0837

Index

W

WC parameter (JES3)   22
work-selection criteria
   defining to JES   10
   specifying in JCL   48
   specifying in JES2   18
   specifying in JES3   22
WS parameter
   in DEVICE statement (JES3)   22
   in PRTnnnn statement (JES2)   18

Y

YEAR_FORMAT parameter   34

IBM ®

Product Number: 5655-M32

Printed in USA